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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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VIETNAM

U.S.-BUILT NUCLEAR REACTOR OPERATION, USSR ASSISTANCE DESCRIBED

Vientiane PASASON in Lao 6 Nov 85 p 3

[Article by Keosuvan: "Vietnam: Progress in Nuclear Energy To Serve Economic Zones"]

[Text] Before liberation, in southern Vietnam, the American imperialists established an atomic research center for the purpose of developing nuclear weapons to kill the people of Vietnam. But the moral side won the victory. Under the leadership of the Communist Party of Vietnam, the people of Vietnam eliminated the neocolonial administrative system implemented by the United States and built a new life for themselves. The cadres at the Atomic Research Center, which is located at Dalat in southern Vietnam, changed the direction of the research. Now, they are trying to develop atomic energy to help restore the economy.

In close cooperation with Soviet experts, the cadres and workers have restored and increased the capacity of the nuclear reactor and taken measures to protect the environment from radiation. It can be said that everything has been completely rebuilt. The original foundation could not be used. After 2 years of construction, the tests done on the increased capacity of the reactor showed that the reactor was capable of meeting the plan's objectives. For the first time, an automatic operating and warning system was installed. This system is operating normally, and there is good protection from the high radiation. This system, together with the various techniques developed by the Dalat Atomic Research Center, is the heart of the reactor.

The components of the heat transmission system were maintained by crossing the currents of the old "talika" reactor. Using WR-M type fuel rods and other technical methods, the planners increased the capacity of the reactor to 400 kilowatts. The reactor's neutron flux is measured at a neutron current of 20,000 billion per square centimeter per second. This value is the highest value. But the important thing is that this can ensure the efficiency and stability of various activities. The important task of the Atomic Research Center is to conduct geological studies and do research on the agricultural environment, industry, public health and so on. Besides that, the Atomic Research Center has succeeded in generating electricity using nuclear power for several areas in Dalat. At present, the scientific cadres at the center have formulated basic plans and organization for generating low-power radiation, that is, Beta ph 32, which will be used in large hospitals such as those in Hanoi and Ho Chi Minh City. Besides this, they have produced TC-99 [Technetium], which is a type of radiation that is used quite often in studying diseases. The scientific and technical base of agricultural industry and other matters have been studied and tested at this center. In the future, tne Dalat Atomic Research Center will become a major research center for the study and use of nuclear energy. Nuclear energy will be used to expand the economy of Vietnam in a more efficient manner. The achievements mentioned above have been scored with the help of the Soviet Nuclear Energy Organization, which has constantly monitored things closely and given guidance. This also shows that only the fraternal socialist countries have a spirit of proletarian internationalism. They have constantly given support on all fronts regardless of the difficulties encountered.

11943
CSO: 5100/4303

OPPOSITION TO NUCLEAR POWER PLANT DEVELOPMENT

LD190540 Belgrade TANJUG in English 0353 GMT 19 Dec 85

/Daily feature by Dusan Zupan: "Yugoslav Dilemmas--Nuclear Power Plants, Yes or No"/

/Text/ Belgrade, 19 Dec (TANJUG)--Polemic about nuclear power plants is in full swing in Yugoslavia. The expert and political circles, and the general public, are vehemently arguing for or against the building of nuclear power plants in future.

The immediate cause of the polemic is a recently announced public bidding for the building of two 1,000 mw nuclear power plants by the end of the century, and another two of the same capacity the construction of which is to start in the year 2000.

Firms from the United States, the Federal Republic of Germany, Italy, Canada, France and Japan have already paid the 20,000 dollar tender price, and the Soviet Union is expected to send in a tender too.

The supporters argue that Yugoslavia cannot wait for better times as its energy resources are very limited. They maintain that it is high time the Yugoslav science and technology become more engaged in nuclear technology projects, and see the buidling of nuclear power plants as a chance for the domestic industry and construction sector to expand activity in which, according to their estimates, the domestic participation could account for even 60 percent.

They refute the arguments of the opponents who warn of the environmental pollution, the short working life of nuclear power plants and potential dangers of uranium waste by quoting a well-known Yugoslav academician who said "the opponents of nuclear energy resemble those Red Indians who dreaded the iron horse."

More convincing, for the average Yuoslav citizen at least, are the arguments of the opponents, although both sides use diametrically opposed date on the country's energy potentials in trying to corroborate their stands. Thus the opponents of nuclear power plants say that Yugoslavia has coal reserves for at least a hundred coming years and, consequently, no reason to rush with the decision. Furthermore, they say, the country's water potentials are far from being adequately used, not to mention the possibilities opening with solar energy, biomasses and other energy sources. As huge amounts of money are involved anyway, it is much better to invest it to further develop the existing methods of energy production, master new and cleaner technologies, and develop technologies which can save up to 15 percent energy, they say.

Yugoslavia cannot afford the luxury of building nuclear power plants now that their building has almost entirely stopped in the world and even the already commenced construction has been suspended, the opponents argue. They propose that Yugoslavia proclaim a moratorium until the year 2010, as the Scandinavian and some other countries have done.

One of the opponents' chief arguments is of political nature. What will happen if Yugoslavia runs short of uranium fuel, will it become dependent on foreign countries for uranium, the big powers above all, they ask the embarrassing question to which no precise answer has yet been given.

The opponents' retort the "iron horse" argument by saying that more fitting for nuclear energy supporters are the words "apres moi le deluge," alluding to the harmful consequences for Yugoslav generations to come.

The final decision on the construction of new nuclear power plants will be taken by the Federal Government next year, at a recommendation by a special expert commission. It is believed that the decision will also be influenced by the country's material potentials since the four nuclear power plants would cost some 15 billion dollars at the current prices.

It remains to be seen how successful either side will be in the effort to win the public for their arguments, as this is also an element which the Federal Government must take into account.

/12228
CSO: 5100/3012

ARGENTINA TO AID PERU IN PRODUCTION OF RADIOISOTOPES

Lima EL COMERCIO in Spanish 9 Dec 85 p A-6

[Text] Starting in 1987, Peru will be able to begin producing radioactive isotopes for agricultural, medical, and industrial use. This will be made possible through a new nuclear energy agreement signed by our country with Argentina.

By means of this agreement, Peru has assured the completion of its Huarangal complex, as well as studies of uranium mines in Puno and the construction of a pilot plant with an approximate annual production of 30 tons of uranium. The agreement also covers the completion of the "ten" power reactor.

The engineer Alberto Constantini, head of Argentina's National Atomic Energy Commission, made this announcement yesterday, shortly before leaving to return to his country. The agreement, which has no termination date, was signed by the head of the IPEN [Peruvian Nuclear Energy Institute], Gen Juan Barreda Delgado.

Constantini reported that the new Peruvian-Argentine nuclear energy accord offers clear proof that they are working together for the benefit of both nations. He said that, as Argentina and Peru are countries with a peaceful tradition, their development of nuclear energy has no other intent but for peaceful purposes.

Puno Uranium: a Great Future

Under this agreement, Argentina will conduct studies of the uranium mines in Puno. He indicated that a pilot plant will be built, to produce about 30 tons of uranium a year.

As for the Huarangal complex, the accord ensures its completion, the technical training of its personnel, and the completion of the "ten" power reactor. According to Constantini, Peru will be able to start producing radioisotopes within the next 12 months, but its full production potential could be reached within 30 months.

He added that all the economic problems left unresolved from the previous agreement have been worked out. "Personally, I feel that this new agreement will be beneficial for both Peru and Argentina, countries united by eternal ties of friendship," he said at the airport shortly before boarding his flight to return to Buenos Aires.

The Argentine Program

"Despite the present economic climate, Argentina has earmarked $600 million for its nuclear energy program for next year," said Constantini. Two plants--of 150 MW and 300 MW power--are in full operation.

A third plant is under construction, and is 40 percent completed. Finally, a fourth nuclear power plant is now planned. "We want the world to know that our nuclear energy program is a peaceful one. We are thinking of the well-being of our peoples. We have definitely discarded any option of military use," he said upon departing.

7679
CSO: 5100/2030

UNION SAYS NUCLEAR DEVELOPMENT IN DANGER

PY021405 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2055 GMT 1 Jan 86

[Text] Buenos Aires, 1 Jan (NA) -- The ENACE [Argentine Nuclear Enterprise for Electrical Power Plants] trade union has warned that nuclear development in the country "is on the brink of collapse," thus threatening "our capability for making autonomous political decisions." ENACE stated that "budgetary cuts and especially a lack of interest in independent nuclear development are endangering scientific-technical and economic activity in the immediate and long-term future." ENACE added that "these problems, which would be serious in any industry, could have a disastrous effect on areas such as power supply and nuclear plants and on our capability for making autonomous political decisions."

The ENACE union expressed its position in a communique signed by its press secretary, Fernando Bujan.

"The efforts of the Argentine people for over 30 years have yielded results in nuclear development of a magnitude unparalleled by those achieved in any other industry," the ENACE communique stated. In this regard, the communique warned that "a situation now prevails in which everything thus far achieved in production and research facilities, equipment, and training of international caliber scientific-technical personnel is being thrown overboard."

The communique added: "Besides the paralysis affecting the National Commission for Atomic Energy [CNEA], there are 100 percent delays in the third nuclear power plant, Atucha II, the construction of which is the responsibility of ENACE." For ENACE, "this involves nonproductive cost increases for which requests for millions of australes are quickly being processed," according to the communique.

"Low salaries and instability have prompted the departure of workers, whose training has required an investment of many years and much money, to increase at an alarming rate," the communique added. "In the case of ENACE, the workers leaving the country could be replaced by foreign personnel, but at a cost ratio of about 7-to-1 in comparison to domestic personnel."

"The combination of ENACE's business irresponsibility and ENACE and CNEA's dependent and socially insensitive thinking are causing a dismantling of nuclear activities in our fatherland," according to the communique. In keeping with this, the ENACE communique urges "that those who through sabotage or the misery of the workers want to do away with the possibility of achieving independent nuclear development be stopped."

/9274
CSO: 5100/2034

CNEA CHAIRMAN SAYS UNION STATEMENT 'IRRESPONSIBLE'

PY031657 Buenos Aires NOTICIAS ARGENTINAS in Spanish 2153 GMT 2 Jan 86

[Text] Buenos Aires, 2 Jan (NA) -- National Commission for Atomic Energy (CNEA) Chairman Alberto Constantini today termed "irresponsible" a statement by the ENACE [Argentine Nuclear Enterprise for Electrical Power Plants] trade union and stated that in January. renegotiations of the contracts for the construction of the Atucha II nuclear power plant, which "will be operating in 1992," will be concluded.

In statements to NOTICIAS ARGENTINAS, Constantini said CNEA's 1986 budget, including works in progress and CNEA's external debt, will be between $500 and $600 million. He said that this year "there will be enough funds to reactivate the Atucha II project."

Thus, Constantini countered a statement by the ENACE trade union that nuclear development in the country "is on the brink of collapse" and that CNEA's manpower is being "thrown overboard." Constantini denied that Argentine nuclear development "is on the brink of collapse" and said atomic activities for peaceful uses "are maintaining the same growth rate of recent years. Not only have we preserved CNEA's full scientific-technological development, but we have also preserved its manpower despite the shortage of funds," Constantini added. He reasserted that "there is no flight of CNEA scientists" and commented that "this is proven by the activity in the library, the scholarships to foreign countries, and the support given to the laboratories."

Assessing his nearly 2-year tenure as CNEA chairman, Constantini said: "We have increased all the activities for the application of nuclear energy for peaceful uses, especially in the field of nuclear medicine, and we have made contributions in other fields such as agriculture, industry, and power supply."

Constantini said that "in the field of nuclear power plants, ENACE workers know very well that the nearly 60-month delay of the projects originated 4 or 5 years ago and not when the current government assumed office." Constantini reiterated that President Raul Alfonsin "has made a political decision to complete Atucha II in 1992" and stated that this month, when the renegotiations of the contracts for that nuclear power plant are concluded, "we will stop paying the huge nonproductive expenses" resulting from the halting of the projects.

"All nuclear projects throughout the world had similar delays," Constantini added. "Not only we have preserved the manpower, but we have also improved in the field of radioisotopes and resumed a normal pace in the technological development of nuclear power plants," Constantini concluded.

/9274
CSO: 5100/2034

ANGRA 1 NUCLEAR PLANT SHUTS DOWN FOR MAINTENANCE

PY072139 Sao Paulo FOLHA DE SAO PAULO in Portuguese 5 Jan 86 p 32

[Text] Rio--The Angra 1 nuclear plant, located 197 km south of Rio, was shut down yesterday for its first change of fuel and a general checkup. The plant will reopen during the latter half of May. Because of the shutdown, the southeast region will lose an average of 375.6 megawatts of electrical energy an hour. This will add an additional burden to that already overloaded electrical sector which has suffered two black-outs this year.

Evaldo de Oliveira, 44, superintendent for technical support of Furnas Electric Company, has said that every nuclear plant operating at full capacity has to change a third of its fuel after 10 months of operation. He added that a plant which is operating at a smaller capacity can do so after 15 months, at most. The Angra 1 plant has been operating commercially since January, therefore this first checkup will take place 12 months after it joined the southeast electrical system.

In the opinion of the Furnas director, the Angra 1 plant has been operating at full capacity (626 megawatts/hour) since September 1984, when the operational tests started, although it only began operating commercially in January. It generated 3.113 million megawatts of electricity from 1 January to 30 November 1985, and "will end the year having generated 5 million megawatts. This means it will have operated at an average of 60 percent of its working capacity, which is above the operational average of U.S. plants."

The Furnas superintendent said that the price which Nuclebras will charge Furnas for nuclear fuel is still being discussed. However, the company knows that it will spend $15 million (155.6 billion cruzeiros at today's dollar rate), to change the 48,000 pipes of the reactor's steam condenser vessel.

Oliveira said that when the nuclear reactor of the Angra 1 plant was bought from Westinghouse, it used a chemical treatment in the steam generator which caused corrosion problems. In 1979, Furnas decided to use a different chemical treatment. However, after the reactor was started, the company detected problems caused by barnacles (crustaceans that gather around the condenser tubes), which bore holes in the copper and nickel tubes. These tubes will now be replaced with others built out of titanium. Furnas will take advantage of the shutdown to make the first general examination of the equipment and to replace some parts (pumps, water system, cathodic protection of the tubes, etc). In addition, the company will implement security measures for the operation of the reactor, taking into account the measures that were internationally adopted after the accident in the U.S. Three Mile Island plant.

Furnas will also make a general inspection of the equipment, particularly the turbine and the generator, for which the Westinghouse guarantee period has not yet expired, to check for any abnormal wear. The generator tubes will undergo a series of tests.

/12858
CSO: 5100/2033

NUCLEAR PLANT CONSTRUCTION ENCOUNTERING OBSTACLES

PY232125 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 20 Dec 85 p 29

[Text] Rio de Janeiro--Licinio Seabra, president of the Brazilian Nuclear Corporations, Inc. (Nuclebras) said yesterday that Nuclebras lacks $1.8 billion to finish the Angra-II and Angra-III nuclear plants. This amount will have to be spent between now and 1995, when the two units will be ready. They will have cost the country $7.5 billion--$3.5 billion in direct costs and $4 billion in financial charges.

According to Licinio Seabra, the operational budget approved by the Special Secretariat for the Control of the State-owned Enterprises [Secretaria Especail de Controle das Empresas Estatais--SEST] for next year is hardly enough for the first two quarters, because Nuclebras requested 7.7 trillion cruzeiros and the SEST approved only 3.5 trillion. The total nuclebras budget is 23.4 trillion cruzeros, 67 percent of which, i.e., 15.6 trillion, is earmarked for paying the interest on foreign and domestic debts. Nuclebras is 200 billion cruzeiros behind in its payments to contractors and suppliers.

Since the SEST did not provide the necessary resources for Nuclebras to carry out the minimum work of its 1986 project, a special work group has been formed with experts from the finance, planning, and mines and energy ministries and from Nuclebras and Eletrobras [Brazilian Electric Power Companies, Inc.] to outline before April a recovery program for the nuclear sector.

According to Nuclebras' president, this group of experts will have to outline a milti-year budget for the Angra-II and Angra-III projects.

/9274
CSO: 5100/2031

GANDHI INAUGURATES REACTOR, PROMISES PEACEFUL USE

NC161027 Paris AFP in English 2005 GMT 16 Dec 85

[Excerpts] Madras, India, Dec 16 (AFP) — Prime Minister Rajiv Gandhi, speaking at the inauguration of a new 50-megawatt fast-breeder test reactor — the first ever built in the developing world — renewed his promise that India would use atomic energy only for peaceful purposes.

The plant, at Kalpakkam near here, is considered a landmark in India's nuclear development and is the first in the world using a mixture of plutonium carbide and natural uranium.

At ceremonies at the plant, attended by a large number of Indian scientists and several foreign experts, Mr. Gandhi said that the splitting of the atom "opened a new vista for harnessing energy that could be used for human welfare, but not for destruction." He stressed that India was fully committed to the cause of nuclear disarmament.

The reactor will speed up implementation of India's nuclear programme, aimed at providing at least 10 per cent of the country's energy generation by the year 2000, he said.

A total of 22 nuclear reactors are scheduled to be built over the next 15 years.

Mr. Gandhi christened the new complex the Indira Gandhi Centre for Atomic Research, after his mother and India's preceding premier, who was slain by bodyguards last year.

Georges Vendryes, advisor to the French Atomic Energy Commission, who was among the guests, said the new fuel held great promise for nuclear power generation.

"India could be world leaders in this fuel development and France is very much interested in the results of the fast reactor at Kalpakkam," he said.

C.V. Sundaram, the centre's director, said the sodium-cooled, loop-type facility was being operated at low power at present in order to measure the reaction of the core to the new carbide fuel.

The data could be used to enhance designs for fast-breeders, he said, explaining that a commercial fast-breeder reactor can generate power at competitive prices only if the maximum possible energy is extracted from its fuel rods.

Dr. Hans Blix, director-general of the vienna-based IAEA, said the launching of the Kalpakkam centre was a milestone in the development of nuclear science and technology.

"Its significance extends far beyond the frontiers of India. It is a truly remarkable achievement and shows what can be accomplished by a developing country in the nuclear sphere when the determination and dedication is there," he said.

Nuclear power and nuclear science were no longer the monopoly of affluent, developed countries, he declared.

/9274
CSO: 5150/0042

INDIA

URANIUM SMUGGLING VIA BIHAR-NEPAL BORDER ALLEGED

Calcutta RAVIVAR in Hindi 17-23 Nov 85 pp 16-17

/Article by Harivansh: "Uranium Smuggling to China and Pakistan From Bihar"/

/Text/ The Nepal-Bihar border is notorious for the smuggling activities carried out there. Bihar's political leaders always manage to appoint police officers of their choice in the border areas. They want to make sure that the business of smuggling is not disrupted. Families of high-ranking government officers and politicians travel to Nepal in their private cars and return with their shopping without paying any customs duty. International smugg'ing led by the "Godfathers" with important government positions in Patna and New Delhi is very active in this area. Recently some people trying to smuggle uranium were caught redhanded. Attempts are being made to hush-hush this case.

Mr R. K. Rai, in charge of Farbisganj police station, and Ramdev Tiwari, customs inspector at Anchal, were secretly informed on 15 July that some uranium was to be smuggled out via Jogvani. It is sold at a very high price to foreign smugglers in Nepal, and from there it is sent to Pakistan and China. According to this information a switch was being made on the evening of 7 July in Matiari Village. On receiving this information, both officers contacted the head office in Purnia and requested weapons and men for a raid.

Matiari is situated on the road going from Farbisganj to Nepal via Jogvani. There is an old garden about 300 yards east of this village. According to the information received by the police, the smugglers were going to make a switch in this garden. Several policemen under the leadership of R. K. Rai hid in that garden. They had hidden the police jeep also. Around 1900 pm two men arrived on a Bullet motorcycle from the direction of Farobisganj. After a few minutes a jeep arrived from the same direction. Two men got out of the jeep which continued toward Jogvani. A little while later, an Ambassador car arrived from Jogvani and was parked facing the direction it came from. The police became suspicious by the talk and activities of these people and surrounded them. Some of the suspects managed to run away, but three of them were arrested. According to the inspector from Purnia, about 5 kg of uranium in a polyethlene bag was recovered from the arrested persons.

The arrested persons gave their names as Kartik Virami, Sunil Kumar and Khagendera Singh. On interrogation Sunil Kumar admitted that the uranium was stolen from the mines in Jadugora in Singhbhoom District. He added that uranium was smuggled to Pakistan via Nepal. A motorcycle (Tag number WGS 3957) was also recovered from this raid, but some men managed to escape in the car. They were identified as Rajendar Chowdhary, Ganga Chowdhary and Anil Chowdhary.

Interrogations of the arrested persons revealed that these three men were to give the bag of uranium to Durga Prasad Shah, owner of Tata Sweet Shop in Viratnagar (Nepal). The latter is supposed to have connections with foreign agents.

The police collected more information about the arrested men. It was learned that local people had been aware of Durga Prasad Shah's smuggling activities for a long time. The arrested three men were dealing with Durga Prasad. Ganga Chowdhary and Sunil Kumar went to Rajendar Chowdhary's home where uranium was stashed. They all worked out a plan for the switch. /When the plan failed/ Durga Prasad had made his escape with the money.

The police contacted the local customs officers and the head office in Patna and requested an immediate inquiry into this very serious situation. They also requested analysis of the recovered uranium by experts.

Investigations with the cooperation of Begusarai police revealed that Rajendar Chowdhary was a close associate of the infamous Begusarai smuggler, Kamdev Singh. Kamdev Singh was under the protection of some ministers and had terrorized the whole province of Uttar Pradesh. He was killed in a skirmish with the police a few years ago. The local customs officers revealed that they were also informed that Durga Prasad Shah, owner of Tata Sweet Shop, Viratnagar (Nepal), was associated with smuggling.

The security officer in Purnia made this entry in register number 2654 CR on 31 July 1985, "The evidence received indicates that Rajendar Chowdhary is the most important character in this drama. It has been learned that he was a close associate of the notorious smuggler Kamdev Singh."

In his conclusion, the investigating officer said that "they had conspired with the local officials of Jadugora mines to smuggle the expensive uranium for making money. Their action was against the interests of our own nation. They were planning to send uranium to China and Pakistan via Nepal. They were unsuccessful in their effort when the local officials got wind of their operation and were arrested while trying to smuggle uranium."

The investigating officer requested immediately arresting and taking strict action against the absconding culprits. He had also requested analysis of the confiscated uranium by nuclear scientists. He also wrote to the headquarters asking for an immediate investigation by the local police of the Jadugora uranium mines.

The investigating officer concluded in his report that this involved an international gang and that the security of India was involved. He requested an immediate inquiry by the CBI /Central Bureau of Investigations/.

On 1 July 1985, the assistant inspector general of the Criminal Investigations Division at Patna took over this case as per his memorandum 915 NGO, dated 25 July 1985. According to our sources, the assistant inspector general appointed Inspector Motichander Ram to investigate this case. "This case was closed in August 1985," Mr Ajit Sarkar said.

According to government sources, these smugglers have high contacts. When uranium was confiscated in that raid, the bosses of these smugglers became very active. They were trying their best to have the case dropped without full investigation.

This is a serious affair. It is connected with national security. The investigating officer of Purnia had requested involvement of the CBI and analysis of the confiscated evidence by experts. He had also asked for the investigation of some Jadugora persons who were involved in smuggling. Instead, this case was dropped on recommendations by a petty officer (who is much junior to the investigating officer). Is this action logical? Can a police officer decide if the recovered material was uranium or not?

Ajit Sarkar, a very vocal member (CPM) of the Bihar Legislative Assembly wants to shake the whole country on this very serious issue. He believes that leaders and high officials have started to stake the country's security in their wheelings and dealings. According to Mr Sarkar: "...Such actions demoralize honest police officers. The arresting policemen and officers were recommended for decoration by the investigating officer. What will these policemen think when they see the case being dropped because of political pressure?"

7997/12228
CSO: 5100/4726

INDIA'S NUCLEAR POWER DEVELOPMENT POLICY DISCUSSED

Hanoi NHAN DAN in Vietnamese 25 Nov 85 p 3

[Article by Professor Nguyen Dinh Tu, director, National Atomic Energy Institute: "On the Occasion of Premier Rajiv Gandhi's Forthcoming Visit to Vietnam -- India's Nuclear Power Development Policy"]

[Text] In a speech at the 29th session of the International Atomic Energy Agency (IAEA) General Assembly held in September 1985 in Vienna, the capital of Austria, Dr R. Ramanna, chairman of the Indian Atomic Energy Commission, said, "The 1984-1985 period was a year of great success for the atomic energy program of India. Two new reactors were put into operation. An experimental reactor, with output of 100 megawatts (Footnote 1) (1 megawatt = 1 million watts = 1,000 kw.), uses natural uranium and heavy water (Footnote 2) (Heavy water is water in which hydrogen atoms have been replaced by deuterium atoms. It has the characteristic of absorbing neutrons very slightly) and was put into operation on 8 August 1985. The late Prime Minister Indira Gandhi named it 'DHRUVA,' an ancient word meaning 'North Pole Star.' Another important achievement was the fact that the second reactor of the nuclear power plant at Kalpakkam, near the City of Madras, was completed on 12 August 1985 and connected to the power network."

With the great vision of its leaders and the talent of its scientists of world renown, India had seen very early the extremely important role of atomic energy. Back in 1948, the prime minister of India presented to the National Assembly an atomic energy bill and the Indian Atomic Energy Commission (IAEC) was established. Then an Atomic Energy Office was set up under the direct supervision of the prime minister (presently the prime minister still is in charge of this office).

The goals of India's atomic energy program are nuclear power and applications to industry, agriculture, public health and scientific research.

Why did India consider nuclear power the top goal of its atomic energy program? That was because of India's actual fuel and energy resources. Its potential hydroelectric power capacity is 75 million kilowatts, with actual production capacity being 30-40 million kilowatts; if this figure is to be exceeded, construction will be very difficult and create many complicated ecological problems. About coal, the estimated deposits are more than 100 billion tons, with annual production currently being about 100 million tons and probably reaching 500 million tons by the year 2000. The production of thermoelectric power using coal presently reaches a total of 30 million kilowatts and is expected to reach 50 million kilowatts by the end of this century. A major weakness is the fact that in the mines coal distribution is irregular and the ash content is large (over 20 percent in many cases). Due to large extraction and transportation costs, electricity produced from the use of coal will be very expensive for the areas far from the mines. Other forms of energy (solar, wind, biological gas, geothermal) are either scattered or not yet developed to the point of being exploited on a large scale. In the meantime, India's electric power needs become larger and larger. While its total capacity presently is 40 million kilowatts, the projected need for the year 2000 will be 100-120 million kilowatts. About oil and gas, although India has increased the rate of extraction on its continental shelf, its production still cannot satisfy the current need and India must still import additional quantities of oil and gas. The production costs of electric power of oil-using plants are higher than those of coal-using plants.

That was why India had to think of the nuclear power solution. That was also the trend in the world and the conditions of India's resources also allowed the selection of this solution. However, since there are many ways to develop nuclear power, what would be the way to be selected? As the choice had to be made in the 1950's, when the world nuclear power industry was in its early stage, it was not an easy one. But with its talent and brain power, India succeeded in selecting a really correct nuclear power development strategy (and in general nuclear energy strategy), which has been proved the best for its conditions. The first basis was the nuclear fuel deposits. Surveys showed India has not very large deposits of uranium (U) ore and the U content in the ore is not very large in general. The deposits in the form of U oxide are about 73,000 tons, but the economic exploiting capacity is only about more than 49,000 tons of U oxide. On the other hand, the thorium (Th) ore deposits are very large, among the largest in the world, by estimate more than 360,000 tons. With such resources and with the capabilities of its industry, what nuclear power development strategy India would choose for itself? At that time there were three types of nuclear reactors it could choose for power production. One was the type of nuclear reactor using enriched U (Footnote 3) (Enriched U is U in which the isotope 235 exists in larger percentage than that of the same isotope in natural U, which is 0.72 percent) and plain water as moderator. From a purely economic standpoint, this type would be the best, but the production of enriched U, which must be used, requires very complex technology and only a few countries in the world can produce it. Second, the type of reactors using natural U and the moderator is graphite. From the standpoint of being self-sufficient, for India this type of reactor would be acceptable, but actual calculations pointed to the fact that investment expenses would be too great. Third, the type of reactors using natural U and the moderator is heavy water. This type of reactors uses U in the most effective manner and also produces a new nuclear fuel, plutonium (Pu), in the largest quantity. For a country that does not have very large U deposits like India, which also wants to avoid having to produce enriched U, to choose this type of reactors would be the most appropriate move. Naturally, with this type of reactors to master the technology needed would be far from simple; in addition, India would have to know how to produce a large quantity of heavy water to be used in such reactors. India chose this road.

At the same time, its scientists adopted a long-term nuclear power development strategy consisting of three stages. Stage 1: To use the type of neutron heat reactors with natural U and heavy water (called PHWR for short). This type of reactors produces both electricity and Pu for the next stage from natural U and weakened U (Pu is produced by neutron action). Stage 2: To build the type of fast neutron reactors (also called breeder reactors) operating with Pu, produced by the type of reactors in the earlier stage, and due to its nature, producing even more Pu (from weakened U) or a type of new nuclear fuel, uranium 233 (from Th, by neutron action). Stage 3: To build the type of fast breeder reactors operating with U 233 (produced in stage 2) and from Th producing even more U 233, in a closed cycle and on an increasing scale.

Since India has large quantities of Th, by the time it reaches stage 3, its ability to develop nuclear power will be very great.

As early as in 1979, India already approved a plan that calls for producing by the year 2000 10 million kilowatts of nuclear power of the PHWR type (except the first nuclear power plant bought from the United States, operating with enriched U and being put into operation in 1969). These reactors will produce each year about 3,200 kilograms of Pu, enough to build in the first decade of the 21st century additional fast neutron reactors(breeder reactors) to generate 1 million kilowatts. With the quantities of Pu produced by the breeder reactors, in the last half of the 21st century there will be enough fuels to produce 350 million kilowatts of nuclear power. And when all of its Th is used, the total output will be even much higher.

As early as in the 1950's, India gradually proceeded with totally following that strategy: to build nuclear reactor and technology research facilities, to train science and technology cadres, to look for and explore radioactive ores, to process U and Th into fuels for reactors, to do research on designing and making fast neutron reactors and to build them, to recycle the spent fuel rods to recover Pu or U 233, to treat radioactive waste, and so on.

The first major nuclear science center was built in Trombay (near the City of Bombay). It was there that India's first reactor was put into operation in 1956. And it was near this reactor that Dr R. Ramanna shook hands with President Ho Chi Minh at the time of the latter's visit, a fact that Dr Ramanna warmly recounted to Chairman Pham Van Dong and his Vietnamese colleagues when he visited Vietnam at the end of April 1985. Since 1967, the center has been named after India's well-known scientist, Dr H. Bhabha, the first chairman of the Indian Atomic Energy Commission, as the Bhabha Atomic Research Center (BARC for short). Presently it is one of the largest nuclear centers in the world, with more than 15,000 cadres, including 3,730 scientific cadres, and more than 7,000 technical cadres. It has five reactors (including the above-mentioned 100-megavolt DHRUVA reactor, which was totally built by India and put into operation on 8 August 1985). It was here that the first experimental reactors using Pu and U 233 were built (PURNIMA-1, later PURNIMA-2). PURNIMA-2, which began to operate on 10 May 1984, is the only experimental reactor in the world using U 233 and using the smallest amount possible of U 233 -- 440 grams. That is the greatest achievement of India's nuclear technology sector, which is moving toward using Th in the future. Almost all nuclear scientific and technical questions are tackled in research work at BARC and later are developed in research and production installations elsewhere in India.

The construction of nuclear power plants has reflected India's very wise and correct policy toward importing and mastering the very complex and advanced technology that is nuclear technology.

While India was actively preparing for building nuclear power plants using reactors of the natural U-heavy water type, it imported the first two reactors for the nuclear power plant in Tarapur (in Maharashtra State), the type of U.S.-made reactors operating with enriched U that was then considered relatively perfect. The purpose was to bring nuclear power into India early and to let its science and technology cadres have an early experience in building and operating a nuclear power plant under Indian conditions. The plant became operative in 1969 and encountered many technical difficulties in its first year of operation. Then, with improvement on the part of Indian technicians, the plant was in a better shape. But later it had to face some difficulties that had arisen from a U.S. refusal to continue supplying enriched U; and India had to do research by itself on replacing it with Pu recovered from the spent fuel rods.

By the time India had a second nuclear power plant, it had firmly decided to use the PHWR natural U-heavy water type of reactors. This second nuclear power plant was built in Rajasthan State and consists of two PHWR's of 220-megawatt capacity each. The first one was built with the cooperation of Canada, with planning and equipment coming mainly from Canada and with negligible participation by India. It was put into operation in 1972 and in the first years of operation at low output level, there were many breakdowns, mostly water leaks in the radiation detection component in the 1981-1982 period.

The second reactor was mainly produced by India, with its own equipment and with considerable contributions from Indian industry. It was put into operation in 1981, and right in the first year of operation, it worked better than the first reactor. That was a great progress in India's efforts to master the nuclear power technology in connection with the use of PHWR's.

However, not until the construction of the third nuclear power plant in Kalpakkam, near the City of Madras, did India fully master the technology. This plant also has two PHWR-type reactors, each having a 235-megawatt capacity. Many improvements had been put into its planning and almost all materials and equipment had been produced by India. The first reactor was put into operation in July 1983, and since then India has been considered the seventh country in the world having totally by itself planned, manufactured, built, started and operated a nuclear power plant. And finally on 12 August 1985, the second reactor was also put into operation.

Thus India so far has 3 nuclear power plants, with 6 reactors operating at a total output of 1.3 million kilowatts. Two other nuclear power plants, each having 2 PHWR-type reactors of 235-megawatt capacity, are being built in Narora (in Uttar Pradesh State) and Karhapa (in Gujarat State).

In order to carry out its program of producing 10 million kilowatts of nuclear power by the year 2000, India must continue to build 12 PHWR's, with capacity of 235 megawatts each, and 10 reactors of 500-megawatt capacity each. The sites for them have been or are being selected, with the conditions for ensuring fulfillment of this program being already set.

With 37,000 tons of U oxide enough to produce 10 million kilowatts of nuclear power in 25 years, India needs only to expand its mines and ore-refining plants in order to produce 1,800 tons of U oxide a year by the end of this century. The necessary quantity of heavy water is 13,000 tons; presently, India has been building 5 plants to produce heavy water and needs to build 4 large plants in order to reach the producing capacity of 1,530 tons of heavy water per year by the end of the century.

The installations that produce fuel rods and the plants that reprocess fuel rods must all be expanded. Industries must be mobilized for manufacturing the equipment necessary for construction of nuclear power plants; as a result of this, such sectors as engineering, metallurgy, electronics, and so on will move to a higher degree of development. To have enough cadres for the program aimed at production of 10 million kilowatts of nuclear power requires the training of 6,000 additional scientific cadres and 29,000 more technical workers.

From the economic standpoint, by the 1983 calculations, the cost of nuclear power was 6.4 percent cheaper than the cost of electricity produced by a coal-using power plant of the same capacity located right next to a coal mine; if this coal-using power plant were located at a distance of 800 kilometers from a coal mine, the cost of nuclear power would be 24.5 percent cheaper.

From the standpoint of safety, the experience in operating the nuclear power plants showed that the increase of radiation level was negligible (only about 1 percent of the natural radiation background). We should add that coal also contains radiation, though very little, but since the coal-using power plants must use very large quantities of coal, they emit a level of radiation 4 times higher than that emitted by nuclear power plants of the same capacity.

The picture will not be complete if we do not mention India's great achievements aimed at preparing for the later stages of its nuclear power program. In order to do research on fast neutron breeder reactors, India has built the Reactor Research Center (RRC) in Kalpakkam. There, a fast neutron breeder reactor of 40-megawatt capacity (FBTR) using carbide compound with Pu-u as fuel and Na and molten metals as heat carrier is being built for operation to start at the end of 1985. When this reactor is completed, India will rank itself among the most advanced nations in this extremely complex technical field. At the same time, while the construction of this 40-megawatt reactor goes on, Indian science and technology cadres have also started planning for another fast neutron breeder reactor to be used in a nuclear power plant of 500-megawatt capacity.

Along with mastering the fission technology, India has also done research on other fields of advanced science, such as controlled thermonuclear reaction, including the method of using high-power laser to create thermonuclear reaction, high-energy accelerator, and so on. With this goal, a research facility called Advanced Technology Center (CAT) has been built in Indore, in the central part of India.

Along with the Soviet Union, India is a model of the policy of using atomic energy for peaceful purposes. With a creative policy of self-reliance and selfstrengthening, in more than 3 decades India has made brilliant achievements. We wish the nuclear scientists of India good success in making new achievements and attaining their noble goal of using atomic energy for peace and for a happy life of man.

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CSO: 5100/4728

INDIA

OFFICIAL DISCUSSES PROGRESS IN NUCLEAR POWER

Bombay THE TIMES OF INDIA in English 25 Nov 85 p 1

[Text]

BARODA, November 24 (PTI).

TARAPUR is one of the sites being considered for setting up a 500 MW atomic power station, the Nuclear Power Board (NPB)chairman, Dr. M. R. Srinivasan, said today.

Designing of the proposed nuclear unit likely to be commissioned by 1995, had made a good progress and the Centre's decision on the site was being awaited, Dr. Srinivasan told reporters here.

The country had made a substantial progress in designing and mechanised contruction techniques for nuclear power station erection and soon it would be possible to build an atomic unit in seven year's time, as against eight years at present, he said.

The nuclear power units were "quite safe" for generation of large quantities of power and the government was encouraging manufacture of components and instruments for atomic stations, Dr. Srinivasan said. At least 90 per cent of components at the Kalpakkam station near Madras were made indigenously, he said.

Advocating use of nuclear power, he said atomic energy would come in handy particularly at a time when the prices of conventional energy sources like coal and petroleum gas were rising.

India must expand its nuclear power base for all round economic growth, he said adding that for this adequate financial resources should be sanctioned at the earliest.

UPCOMING PROJECTS

Giving details of upcoming projects, he said erection of two units of 235 MW each was on at Kaiga in Karwar region of Karnataka. Work on nuclear units was also apace at Narora in Uttar Pradesh and Kakrapar in South Gujarat, he said.

UNI adds: According to Dr. Srinivasan, once industrial capacity was built up for a programme of 10,000 MW, a stage of maturity would be reached which would permit a more rapid acceleration of nuclear power capacity.

For this, it was necessary not only to accelerate the present programme of building reactors based on heavy water and natural uranium, but also build fast breeder reactors and eventually utilise the "virtually inexhaustible" energy resource available in thorium, he said.

Estimates of the energy potential show that the uranium resources available in the country can support a programme of 350,000 MW when they are fully utilised by fast reactor and possibly a million MW when the country is able to exploit thorium, he said.

The industry is now at a stage when it can make the high quality components in short periods. Therefore, what is now required is a commitment of adequate resources so that work could commence on a number of projects at the same time and batch orders of equipment be given, he said.

At the same time, the board has standardised designs and proposes to use mechanised techniques of construction so that the time taken to build a nuclear power station comes down from eight to seven years, he said.

About safety, he said the radiation risks from nuclear stations were less than those from many other normal activities.

A nuclear power plant does not produce any significant quantity of radioactive waste, Dr. Srinivasan said.

The technique available today is for this waste to be substantially reduced in volume and vitrified into a glass matrix of small volume.

The vitrified waste is encapsulated in stainless steel and buried underground for long-term storage, he said.

The quantity of waste from a 1,000 MW nuclear power station operated for one year is only three cubic metres, he added.

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CSO: 5150/0040

INDIA

PLANS FOR CONSTRUCTION OF NUCLEAR REACTORS TOLD

Bombay THE TIMES OF INDIA in English 18 Nov 85 p 5

[Text]

BOMBAY, November 17 (PTI): The Department of Atomic Energy (DAE) proposes to start work on a maximum of eight power reactors of 235 MWE capacity and six units of 500 MWE capacity during the seventh five-year plan, according to highly-placed sources.

This would include the already announced two units at Kota in Rajasthan and two units at Kaiga in Karnataka (all 235 MWE capacity) the sources said.

The sites for the remaining reactors are yet to be finalised, though the site selection committee of the DAE had submitted a detailed report on this to the Union government last year itself.

However, the DAE is reportedly planning for large-scale expansion of the Tarapur Atomic Power Station and the country's first two 500 MWE nuclear power reactors are likely to be located there, the sources said.

The Centre has sanctioned Rs. 1,400 crores for the nuclear power sector during the seventh plan, though the DAE had asked for Rs. 2,600 crores. "We are expecting more money during the mid-term review," the sources said.

The DAE authorities are yet to finalise whether to invest the sanctioned money in a few reactors and try to complete them fast or to "spread it across". However, the Prime Minister, Mr. Rajiv Gandhi, had said the seventh plan would give more emphasis on the hydro-electric sector, as "we want to start power generation immediately".

At the end of the seventh plan, the DAE would be able to add only the two 235-MWE reactors at Narora in U.P. to the nation's power generation capacity. Even the two Kakrapar units, work on which has already started, would begin to function only by 1991.

The DAE's ambitious plan is to achieve 10,000 MWE nuclear power capacity by 2000 A.D. and the 'profile' for this has already been approved by the Central cabinet.

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CSO: 5150/0037

BJP LEADER TELLS PARTY STAND ON NUCLEAR DEVELOPMENT

Bombay THE TIMES OF INDIA in English 18 Nov 85 p 7

[Text] Warangal, November 17 (PTI)--India should make an atomb bomb and the Prime Minister should declare it openly, instead of "dilly-dallying" on the issue so that it might deter Pakistan from going nuclear, according to the Bharatiya Janata Party (BJP) president, Mr Atal Behari Vajpayee.

"The Centre has to take a clearcut stand as its pronouncements about a nuclear threat from Pakistan were creating confusion within the country," he told a press conference here today.

Asked how an open declaration by the Prime Minister would help the country, he said ours is a democratic nation unlike Pakistan and the people have the right to know whether such an option is desirable.

Mr Vajpayee stressed that "too much dependence" on any superpower was not in the interest of the country and regretted that the Centre was "slowly giving up" the goal of self-reliance and following a policy of "double dependence" for high technology on U.S.A. and for arms on the U.S.S.R.

Referring to India's relations with the Soviet Union, he said co-operation was a must and the friendship should also be strengthened but he felt "we are depending too much."

Asked what was the alternative when America was pumping sophisticated weapons into Pakistan, he said "The Prime Minister should have converted Mr Reagan."

It was unfortunate that the Indian doors have been left wide open for multinationals, who are only interested in profits and not in the country's development, he said.

/9317
CSO: 5150/0039

JANATA OFFICIAL GIVES POSITION ON N-WEAPONS

New Delhi PATRIOT in English 30 Oct 85 p 5

[Text] Senior Janata Party leader and member of the national executive Krishan Kant has taken strong objection to party general secretary George Fernandes' stand on India's nuclear options and said that Mr Fernandes did not represent the party's position on the issue.

In a strongly worded statement issued in New Delhi on Tuesday, Mr Krishan Kant said that the "advice" of US President Ronald Reagan to Prime Minister Rajiv Gandhi about the Pakistani progress on the nuclear weapon should have opened the eyes of all patriotic people and that there could now could be "no dilly dallying and weak hearted moral objections to India going nuclear."

"George seems to be a conscientious objector to nuclear violence," Mr Krishan Kant said and added that his (George's) stand "logically leads to a position where he would consider it morally correct to throw Indian armed forces into the battlefield against a nuclear adversary and want them to offer civil resistance when we do not have a comparable weapon by a conscious decision."

"This cannot be the position of a responsible political party which is fighting back to power," Mr Krishan Kant said. The Janata Party recalled the Bangalore resolution of the Janata Party on the nuclear question adopted "in spite of the opposition of Mr Morarji Desai" in June 1981 which had stated that India will have to go nuclear if Pakistan goes nuclear.

In fact, Mr Krishan Kant added, the Ballia resolution had gone a step further by stating that India had a right to exercise its nuclear option in full freedom making it clear that India was not circumscribed by Pakistan but by all possible adversaries including China. The position was explained to Mr Fernandes in Ballia, Mr Krishan Kant said, but obviously he had refused to accept the position.

This is not the first time that Mr George Fernandes' stand on an issue has been clarified as not being the party's official position. A few months back Mr Fernandes had given a call for the boycott of all meetings convened by the Government in protest against Mr Rajiv Gandhi having described some leaders as "traitors" during the election campaign. Party leaders had hurriedly pointed out then that Mr Fernandes had given the call in his individual capacity and leaders like Mr Madhu Dandavate had openly defied the call by participating in consultations by Mr Rajiv Gandhi to solve the Punjab and Assam problems.

/9317
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INDIA

BRIEFS

THORIUM FUEL TESTED--Experiments are being conducted at the Madras atomic power project--MAP--at Kalpakkam to determine the economic feasibility of thorium as a fuel for power reactors. A spokesman of the project told PTI in Madras that 60 kg thorium bundle loaded into the second unit of the MAP is likely to be taken out for irradiation tests some time in February or March next year. [Text] [Delhi Domestic Service in English 0240 GMT 8 Dec 85 BK] /9274

URANIUM IN KARNATAKA--Bangalore, Nov 17 (UNI)--Studies of galena found in the deepest mine in the world--the Champion reefs of Kolar goldfields in Karnataka--by an Indo-Soviet team have indicated the presence of an enriched uranium source in the vicinity of the mine. Dr G.V. Anantha Iyer, a geo-chemist of the Indian Institute of Science (ISSCO) here and a member of the group, said that mass spectrometry measurement of galena revealed the presence of unusually uranium-enriched lead isotopes. These radiogenic lead isotopes must have originated from an enriched uranium source located either in the mine or nearby. He said the studies were carried out in collaboration with Y. Safonov and Enkin and Chernyshev of the Academy of Sciences, USSR. The other Indian geologists were B. Krishna Rao, Department of Geology, Mysore University and V.N. Vasudev, Department of Mines and Geology, Karnataka Government. Dr Iyer said the discovery was made when the team was studying the genetic features of gold ore deposits at Kolar goldfields. [Text] [New Delhi PATRIOT in English 18 Nov 85 p 5] /9317

CSO: 5150/0038

NUCLEAR RESEARCH PARK, ITS PRODUCTS DESCRIBED

Tel Aviv TEKHNOLOGIYOT in Hebrew Oct 85 pp 16-23

/Article: "Activities of the Nuclear Research Center in the Area of Industrial Applications--NRC--the Products That Come After"/

/Text/ In this article the public is presented for the first time in depth with the activities to develop high-tech industries. In an interview with "Tekhnologiyot" the heads of the Nuclear Research Center (NRC) survey the tremendous activity of the center in the area of industrial applications which serve as the basis for an industrial park to be built next to the NRC.

The NRC in the Negev is the center of the Atomic Energy Commission. It was built at the beginning of the sixties near Dimona. Many rumors spread about what was going on between the walls of the center and more than once it served as the central issue in books and articles written abroad about Israel's atomic capability.

In recent years a new type of activity has found expression in the activities at the NRC: moving toward the area of advanced industry. This phenomenon is familiar in nuclear research centers around the world. Everyone tries to exploit the advanced knowledge and the scientific achievements which have accumulated during the years of atomic research, to advance industry and to apply findings and developments in nonnuclear areas. The advantage of nuclear research centers lay in that they developed excellent think tanks whose applications in industry are not unique events or one time events, but rather a regular connection was created between research, development application and production, which repeats itself.

Director of the NRC, Avraham Sarusi, emphasizes that, "the NRC always had scientific and professional contacts. The fact is that many of our people were the first teachers and lecturers of Ben Gurion University. The NRC also has external contacts in the area of scientific and technological development, in the country and abroad. The center is also known from scientific publications of its scientists in professional journals."

The head of the division of Research and Development at the NRC, emphasizes that "nuclear technologies are most advanced. They rely on things which are at the edge of scientific and engineering knowledge in the world. Therefore dozens of learning centers rose around them."

The professional staff of the NRC numbers many with academic and technical degrees. The R&D in the center is carried out by its laboratories, which are laboratories for metallurgy, physics, chemistry, radio-chemistry, electronics, and analytic laboratories. Some of the development work is done in the central factories of the NRC which handle metal, electricity, and plastics.

"In the last 2 years we started to exploit all the knowledge centers possible in different directions," says Avraham Sarusi. "In one area we already have applied knowledge of the NRC in a factory for growing crystals, Kerem Optroniqa, which was established in Dimona. In another case production of uranium from phosphoric acid is applied by Rotam Fertilizer factory, next to the Arad conglomerate. There is also an intention to develop an industrial park near the Oron road, near the NRC. The goal is to centralize there a number of high-tech industries which will make possible development of the area, and will draw outside investors."

Sarusi sees a basic difference between the industries which will be built around the NRC and the high-tech industries elsewhere: "In commercial industry someone comes with an idea, it is applied and sold. Here we already have think tanks, which are able to contribute to industrial application. We have topics in which we are already beyond the R&D stage and some of which have even been applied. Some of the products, such as medical lasers, are already in advanced experiments in hospitals."

"A problem exists in Israel with those high-tech industries that are not actually based on such centers, that exploit a one-time unique idea," emphasizes the director of the NRC. "It is not certain that everyone will succeed in continuing development at the center. If competition comes from the United States, Japan or another country--the picture could change and we will be in a bad situation."

"We are taking topics in which we are experts on the technical side and trying to interest investors who could aid us on the commercial and marketing side," emphasizes Sarusi, "We have a number of ideas ready that we are trying to actualize. However I am not certain that we will succeed in all of them."

The director of the NRC sees in springing into the commercial-industrial market as well a level for increasing industrialization of the Negev. "In our opinion the capability which lies in the entire region, with technical schools and the university which are located in it, is enough for all the personnel required for development in the coming years. Today the people in the area do not have enough places of employment and they are leaving to go north. If we succeed in the coming years to turn this around it will be not only a commercial success but also will have a national dimension."

The Challenge is the Nuclear Power Station

Parallel with penetration of the industrial market and the establishment of factories directors of the NRC today are anticipating the era of the Nuclear Power Station in Israel. The assistant director of the NRC, Tzvi Katzni'el says, "Recently the newspapers have written about contacts made for the establishment of nuclear power stations in Israel and we hope that this matter will indeed be actualized soon in Israel. For many years we have awaited this moment. Many studies which we carried out were directed to this goal. A base was created and a great deal of knowledge accumulated on topics concerned with nuclear power stations, and therefore it is accepted that the NRC will be involved and will contribute greatly in the establishment of future nuclear power stations in Israel."

NRC is in contact with the Center for Nuclear Research (CNR) at Nahal Soreq. This means contact at all levels--starting with coordination of management and down to the work level. There are projects in which work is clearly divided between the two centers, principally in areas in which there is an advantage to one of the two bodies. There are joint projects, which exploit the specific think tanks which developed over the years in each of the centers.

Rotam--The Commercial-Industrial Arm

To enable the penetration of the NRC into the industrial market the Rotam Corp was established, which in fact is the commercial arm of the NRC. Rotam is a government company under the authority of the Office of the Prime Minister.

There were three principle goals behind the establishment of Rotam:

--Establishment of factories based on the think tanks at the NRC.

--Raising of financing sources for R&D which will be done at the NRC for commercial applications.

--Licensing of know-how--sale of know-how or patents to existing factories if there is no need for establishment of a new factory.

"Rotam, as a government company, has made a principle of raising nongovernment money for establishing factories," says the managing director of the company, "Gid'on Shavit. "We seek partners who bring financing, with the NRC supplying the know-how. The ideal partner which we seek should have industrial experience, primarily marketing. We have great experience in R&D and ability in application, and we lack experience in the market."

Rotam's multiyear program includes a number of factories with an investment of about $10 million.

Shavit emphasizes, "It is the nature of things that the elements willing to make such investments are large economic bodies who have the ability to take chances. We are interested in such partners, who would be able to withstand difficulties."

The first factory already established, Kerem Optroniqa, in cooperation with Koor, is located in Dimona and has about 25 employees. The factory was established about a year ago and investments in it came to about $2 million.

Additional factories will be established in the industrial park, which will spread over about 200 dunams. At present two structures are being built in the park by a company for industrial structures: one structure for a future laser factory and the second structure, multipurpose, intended to accommodate smaller factories.

As was stated, in some cases the NRC, via Rotam, sells know-how to other factories. Thus, for example, the NRC recently cooperated with Amcor in development of a personal instrument for radiation detection. The know-how was sold to Amcor, which is producing and selling the device. Rotam earns royalties from this. Another example is a fire resistant material designed for safes. At present Rotam is involved in negotiations with one of the chemical factories in the area, on development of a certain chemical material.

From the Glove Box to the Incubator

As was stated, there are several subjects at the NRC which have reached readiness for industrial application. One subject is that of the glove box: work with radioactive materials or other dangerous materials requires protection of the workers from such materials. Therefore the work is performed within a glove box which is in a state of subpressure in comparison with the environment, with all treatment being done with gloves, or in cases of high radiation, with manipulators. Adapting a glove box to a factory requires understanding and a study of the production process in that factory, with the goal being to simplify as much as possible the process and to protect the health of the employee.

In the area of glove boxes much know-how and experience have been acquired at the NRC and for several years the center has been selling this know-how to industrial factors, laboratories and universities. At present the glove boxes are being produced--and a few have been supplied to factories in the country--in the NRC. The NRC wants to institutionalize the matter from the commercial aspect and to base it as a factory in the new industrial park.

Based on the knowledge accumulated on the subject of glove boxes the NRC developed, with the support of the chief scientist of the Ministry of Industry and Commerce, an incubator for premature babies. This incubator today is in Sha'arey Zedek Hospital and another will soon be installed at Beilinson Hospital. "We hope that the incubator will be one of the production lines of the new factory," says the chief of the R&D Division at the NRC.

Isotopes and Radioactive Sources

The oldest area of specialization of the NRC, which is ripe for industrial application, is that of isotopes, radioactive sources, and labelled molecules. "We offer these products to research institutions, universities, hospitals, and to agriculture," says the chief of the R&D Division. "Materials labelled with radioactive materials are used for monitoring processes or physiologies as well as for therapy. We operate this subject as a business unit which markets these materials in the country and abroad."

Managing director of the NRC, Avraham Sarusi, emphasizes that materials in the area of nuclear medicine are checked by the laboratory for nuclear radiobiology and by the laboratory for radiochemistry which executes the syntheses of the materials. The NRC manufactures the labelled molecules with tritium and also performs chemical treatment of materials such as iodine 125, iodine 131, and phorphorus, which are used for radiologic tests in hospitals. There is also a group specializing in organic syntheses with radioactive materials or anti-cancerous agents.

Production of Uranium from Phosphates

The Atomic Energy Commission has been performing experiments for about 30 years in an attempt to produce uranium from phosphates. Over the years about six different processes have been developed, two of which were found to be effective.

One installation for production of uranium, small in dimension and in its yield, was active at the end of the fifties and at the beginning of the sixties at Fertilizers and Chemicals Ltd. in Haifa. The factory was active for approximately a year and a half and was closed due to economic infeasbility: the quantities were small and the prices high.

Another process was developed and applied at the beginning of the seventies when the Arad conglomerate was established. The acid factory was intended to produce 160,000 tons of phosphoric acid per year, but reality struck the planners of the factory and today it produces 20,000 tons per year. "We developed a process which was specially adapted to the Arad conglomerate," says assistant director of the NRC, Tzvi Katzni'el, "since this was a unique process for producing phosphoric acid." The factory was established and during its trial period a few tons of uranium were produced. But when it became clear that the Arad conglomerate did not meet expectations the installation was closed. "The factory for phosphoric acid today stands as a white elephant," says Katzni'el. "The uranium factory exists but we don't produce since the quantities are quite small."

About 4 years ago in the area of the Arad conglomerate a factory was established for phosphoric acid which operates on a large scale using a classicial process called "the wet process." In this factory the NRC developed a new procedure for production of uranium. Tzvi Katzni'el says that this is "a unique process in the world with advantages over all existing processes today. We have received a patent from the United States and there is great interest in the new procedure."

All of the processes which existed until today were based on liquid/liquid extraction (solvent extraction). The NRC developed a process based on ion exchange. This procedure has many advantages from a technological and economic standpoint: the investment in a factory for producing uranium and cost of production of uranium is about half of that in the regular processes with the same capacity.

The NRC established a quasi-industrial installation for producing uranium using the new procedure, which is in operation near the Rotam Fertilizer acid factory in the Arad conglomerate. In the future--depending upon budget and finance sources--the NRC is planning to establish a factory in the area for production of uranium. Today first contacts are being made with an industrial body in order to examine the establishment of a joint venture in this area.

Nuclear Materials and Equipment

An additional area which developed in the NRC is various materials disciplines. This topic developed as a result of the nature of the nuclear center, which requires a strong base in the subject of materials as a result of the hostile environment of nuclear reactors, radiation, high temperatures and the corrosion. According to the people at the NRC "the matter of materials is one of the subjects in which the NRC excels both in national and in world measurement. We are considered a most advanced laboratory in various topics in disciplines concerning materials."

In the NRC there is a unit for development of plasma coatings for metals. For example--titanium nitride coatings for tools. These coatings protect against corrosion and wear. NRC today is in contact with elements for applying its knowledge in this area. It is its intention to establish a unit (perhaps even a factory) which on the one hand will be able to supply coatings according to specification to those requesting them and on the other hand will be able to develop, to plan and to build installations to produce specific coatings for designated purposes. The estimate on this topic is that within a year it will be possible to achieve prototypes and in 2 years the subject will be ripe for establishment of a factory.

Also in the area of nuclear instrumentation a great deal of knowledge has been developed in the NRC, first as a consumer. "We are a careful consumer who knows to suggest special specifications and requests," says the chief of the R&D Division. "With the support of this knowledge and of the advanced electronic workshops here we recently entered into development of specific nuclear instrumentation. This instrumentation is said to be the basis for one of the factories in the industrial park, whose product will be sold abroad and in the country.

An additional area of specialization of the NRC is filtering and purifying gases and liquids--filtration in nuclear installations. At the NRC filtration based on membranes and fibers of carbon has been developed, which enables work at high temperatures in hostile environment. This area is covered by patents. One of the byproducts is an installation for purification of water for purposes of dialysis, whose development is financed by the chief scientist of the Ministry of Industry and Commerce. This installation will make possible the construction of a home dialysis system. Also being examined are development topics connected with purficiation of gases and their separation in hostile environments and at high temperatures.

Growing Crystals

The topic of growing crystals was developed at the NRC principally for purposes of producing detectors. In this area the NRC's capabilities ripened and the

Kerem Optroniqa factory has already been established. At this factory Sapir products are manufactured--heads for air-to-air missiles and various types of windows, such as windows for chemical processes. One of the advantages of Sapir is its transparency in the visible spectrum, in high temperatures, in hostile environment and its durability against wear. The Sapir can be used, among other things, as windows for chemical reactors and as windows for the periscopes of submarines. Another product is neodymium yag poles for lasers, with principal consumers of these products being laser factories in Israel and abroad.

The topic of crystals today is still at the beginning of its development. The intention is that the crystal unit at the NRC will continue developing other single-crystal products, which will be the next products of Kerem Optroniqa.

Lasers

A lot of knowledge has accumulated at the NRC in the area of lasers. "We want principally to apply two types of laser," says Tzvi Katzni'el. "One laser based on metal vapor and the second the advanced holmium-yag laser."

The first laser is based in principal on brass metal vapor and according to Katzni'el it has advantages over all lasers today existing in the world in the area of eye operations. An additional use of this laser is in the area of identification of fingerprints and in this matter the NRC is in contact with the Israel National Police.

Lasers based on brass vapor in the visible spectrum has greater achievement. They can transmit either a yellow or a green wave. These lasers are considered a future alternative to lasers based on argon.

The industrial prototype of the medical laser of the NRC is already in operation in Beilinson hospital where experiments on eye patients are being performed. This laser can also be used for plastic surgery, such as skin operations. Experiments in this direction have already been made and the final application stage is approaching. "We are in contact with a large economics firm in the country about establishing a factory," reveals Katzni'el. "Within 2 or 3 months, four industrial lasers will be produced which can be used as prototypes. It is possible that we will send one to a hospital or to a medical laboratory in the United States for clinical experiments, at this stage principally on animals."

Based on the metal vapor laser, with certain technological changes, it is possible to produce a laser based on gold metal vapor, a laboratory sample of which already has been developed at the NRC. This laser transmits a red wave at high performance. Due to the length of the wave when it is red, this wave is able to operate properly in interaction with chemicals for photodynamic therapy and it is thus efficient for use in treatment of cancer. By means of this system material which penetrates the cancerous cells is injected and with the next light wave from the laser the material falls apart and causes destruction of the cancerous cells.

The second laser, as was stated is the Ho-Yag laser, which stands for Holmium Ytrium Aluminium Garnet, which is active laser material in solid state in the shape of a crystal rod. When the holmium, which is a rare base, is exposed to bright light, it creates a laser beam in the near infrared part of the spectrum with a wavelength of 2.1 micrometers.

The Ho-Yag laser is expected to be one of the most useful in medicine. An operation using this laser stops the bleeding during the operation. It is also possible using the Ho-Yag laser to penetrate the body using optic fibers without cutting it. Development of this project, being carried out at the NRC, is being done with financing from the Ministry of Commerce and Industry and American investors. The heads of the NRC hope that by the end of the fiscal year the development will be completed. It should be emphasized that this type of laboratory laser is already in use at Beilinson hospital in animal experiments.

Application of the Moire Effect

An additional area of activity is applications of the Moire effect, in which optic fibers are used for mapping. "The Moire Effect has been known for many years already," says the chief of the R&D Division at the NRC, "but we were searching for methods for precise mapping of optic products." The first application of this effect, developed at the NRC, is being used in the wind tunnel of the IAI where a deflectometer of the NRC was installed to perform mapping of density differences. Three similar deflectometers are in the United States.

The NRC is planning in the near future to develop an instrument, based on this idea, for plastic surgery. The reason is that the Moire effect has an advantage when one wishes to map an organ of the body whose shape is not geometrically sophisticated. Based on knowledge accumulated at the NRC on the subject of the Moire effect the heads of the center hope to establish an industrial factory in the future.

Process Monitoring

Over the years expertise has been developed at the NRC in the area of Process Monitoring. In the meantime the NRC performs this as order are received. If it is proven that this area is financially justified, a special plant to deal with it will be established.

Assistant Director of the NRC, Tzvi Katzni'el, reveals that the center carries out the planning and installation of Process Monitoring in advanced, sophisticated factories in the southern area or that are planning to move to this area.

/Box on p 17: Deflectometer Based on the Moire Effect/

A deflectometer based on the Moire effect presents a new approach to nondestructive tests. Instead of measuring differences in optical paths, such as in the systems for measuring interference (the interferometric systems) the Moire deflectometer enables mapping of ray deflections, which are easily processed.

The Moire deflectometer can execute any measurement that can be performed by techniques for measuring interference or other techniques. The sensitivity of this deflectometer enables the user great variety of applications, starting with the examination of optic components at high quality and measurements at low sensitivity.

The deflectometer is able to simultaneously measure modulation transfer functions (MTF). Since the Moire deflectometer is based on geometric optics, precise knowledge of the phase, which is the base for the other type of measurement is not important. Thus the mechanic stability requirements of the system are determined by the sensitivity of the measurement, and not by the wavelength of light. This brings about insulation from shocks and shaking, which enables the Moire deflectometer to be used at the level of the factory and other noisy environments.

Applications include characterization of optical components such as windows, lenses, mirrors, prisms and laser parts; analysis of transparent methods, such as mapping temperatures of flames and visualization of flow; measurements in micrometers of geometric characteristics, static and dynamic.

/Photograph on p 19: glove box/

Glove box developed at the NRC serves as a hermetic cover which separates the material inside from the employee who is doing various things to the material, using gloves and internal equipment suited to the process. The hermetic insulation of the box enables the employee to function without any special protective means such as mask, special clothing, and so forth.

The box must be in a state of relative subpressure as compared with the environment in which it is located, and this is in order to prevent leakage--even the smallest amount whatsoever--of the material located in it to the external environment. Subpressure in the box is achieved by constant pumping from the box via a filter located by the suction vent. Air enters the box through an additional filter, near the incoming air vent. The subpressure in the box is determined with the aid of regulator cocks beside the filters. All of the glove boxes are examined according to the regulations of the Atomic Energy Commission. Permissable leakage: 0.05 percent of the volume of the box per hour.

/Box on p 20: RAM B7--Portable Device for Detection of Radiation/

RAM B7 is a portable instrument for detection of radiation intended to monitor several types of radiation. The instrument employs the CMOS technology with the goal of saving energy. The instrument, based on a microcomputer, has an LDC terminal which enables clear indication of the work conditions. Several types of detectors can be hooked up to the RAM B7. It supplies the detectors with a low frequency and in return receives a logical symbol whose frequency is relative to the field of radiation. The instrument is capable of auto-ranging with alarms which were included in it when programmed. RAM B7 and the detectors are packaged in waterproof material, in order to enable them to operate in difficult environmental conditions and to facilitate decontamination. The system meets the requirements of MIL-STD-810C.

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FOREIGN LIAISON BUREAU ON NUCLEAR TEST BAN

LD261823 Tripoli Domestic Service in Arabic 1700 GMT 26 Dec 85

["Statement" by the People's Committee of the People's Bureau for Foreign Liaison on the Socialist People's Libyan Arab Jamahiriyah's "support for halting the nuclear arms race and all nuclear tests and explosions"]

[Text] While stressing the Socialist People's Libyan Arab Jamahiriyah's support for halting the nuclear arms race and all nuclear tests and explosions, whether underground or in space, due to the resulting destruction and affliction to humanity, the People's Committee of the People's Bureau for Foreign Liaison believes that the Soviet initiative, represented in its declaration to halt unilaterally nuclear explosions and tests until the end of 1985, is a positive development. This may lead to the creation of objective conditions for curbing the arms race and distancing the specter of nuclear war from humanity.

The United States and other countries are urged to respond to this Soviet initiative by halting their underground nuclear tests. The People's Committee of the People's Bureau for Foreign Liaison urges world public opinion, peace-loving countries and popular forces, and organizations to continually struggle to attain humanity's desired objective of realizing world security and peace by halting underground nuclear tests and preventing the spread of the arms race to space.

/6091
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INDO-U.S. COLLUSION ALLEGED IN 'BOMB CAMPAIGN' AGAINST PAKISTAN

Karachi JANG in Urdu 9 Nov 85 pp 3, 14

[Text] The well-thought-out campaign that Indian Prime Minster Mr Rajiv Gandhi began against the Pakistani nuclear program a few months ago has reached its zenith. In 1971, India used the issues of violation of human rights and refugees to make Pakistan look guilty in the eyes of world public opinion. Our friends were put in a difficult spot and, despite their desire to help us, they were afraid to come out on our side. This is the wonder of political governments that in any situation they find ways to attain their national interests. In 1971, India played the card of refugees coming from East Pakistan very expertly and now it has raised the bogey of the Pakistan atomic program with so much success that Pakistan is left with no alternative but to resort to explanations. We know the weaknesses of nonpolitical regimes. In 1971, Pakistan was the country from which refugees had left. Within 9 months, India had not only inflicted a military defeat on Pakistan but also washed its hands of responsibility for the refugees. Against this, in 1978, Pakistan became the host to refugees. Six years have passed, and we have neither sent the refugees back nor have we taught a lesson to Afghanistan. If today Kabul has the backing of the Soviet Union, then in 1971 Yahya Khan, too, claimed the support of America. Even today we swear by the pro-Pakistani attitude of Nixon and Kissinger. To this day it is not known what they accomplished. War on the western front was stopped following a call from Brezhnev, and East Pakistan had been occupied by India. Meanwhile, America is our friend, and the blessings of our nonpolitical regimes amount to this. If, as in 1971, refugees go from our country, we are punished and if, as in 1978, refugees come to our country, we are still punished.

The atomic argument has now reached a critical stage. The fact is that with its 1974 atomic test, India has acquired the capability of making a bomb. But it has made such an issue of the Pakistan atomic bomb, of which there is not a trace, that even our best friend, America, is afraid of coming to our side, and our tested and tried friend, China, thinks it best to take refuge in silence. Our loneliness in the world on the subject of an atomic program is no different than our loneliness in 1971 on the issue of refugees. At that time, too, America agreed on the seriousness of the problem and the Indian wishes to resolve it. Only over the means there was a difference of opinion. Today, too, America shares the Indian concern over the Pakistan atomic bomb and both are agreed that Pakistan should be prevented from building the supposed atomic bomb. In 1971, too, friends of Pakistan were reluctant to support us on the question of violation of human rights and today, too, they find themselves helpless in supporting us on the issue of building an atom bomb. So far as there is the question of making an atom bomb, the people of Pakistan are under no illusions. This nation has suffered a great tragedy. It knows full well the complete story of the reprocessing plant and the nature of the present regime. Why would a government that has made the offer of a friendship pact to India build an atom bomb? What are the reasons for doubting President Zial Haq's statement that Pakistan is not building an atom bomb? America, as well as India, knows full well that Pakistan's atomic program is only for peaceful purposes. THE NEW YORK TIMES wrote only last week: "Officials of the Reagan administration have privately admitted that they do not believe that Pakistan is making an atomic bomb." Despite all this, why is this campaign going on? The answer to this question can be obtained only by analyzing the respective interests of India and America.

India is reaping immense advantage from the atom bomb campaign. Notable among these are: 1) A Pakistani atomic program is a stick with which America is continuously being beaten. Public opinion in America, as well as in western Europe, is being mobilized against the so-called Reagan administration's policy of tilt towards Pakistan, especially the Jewish lobby that supports Israel. As a result, the Reagan administration has been put on the defensive, and it is obliged to be cautious in its dealings with Pakistan. It has very important consequences. 2) Under cover of this campaign, India rapidly advanced its own atomic program, and it would not be surprising if it has already made the bomb. (This is very important.) 3) This campaign is being used to suppress internal opposition in India. 4) World opinion has been prepared for an attack on atomic facilities of Pakistan, and it has been seen to that in case military action is taken against Pakistan in the name of knocking out atomic installations, no one will come to the aid of Pakistan. In this context, it is enough to note that even after the disclosure of Indian plans to attack Kahuta, neither America nor China has yet said what they would have done in the event of an Indian attack or what their reaction would be in case of an attack in the future.

There is only one danger in this last contingency, and that is the reaction of Pakistan. It is true that in reply the foreign minister has threatened a full-scale war. In 1971, Yahya Khan personally made such a threat, and India witnessed its reality. But I feel that today conditions are very different. This time, in case of an attack, Pakistan can surely inflict huge losses on India, and the clock in the subcontinent can be put centuries back. It is another matter that destruction is no guarantee of freedom's safety and that this is not a proper choice. But there are several other possibilities. Sahibzada Yaqub Khan says that an attack on Kahuta will be considered a full-scale attack. A few days back, in a press conference in New Delhi, while speaking on a proposal for mutual inspections, Mr Rajiv Gandhi said, "It is not necessary for Pakistan to keep in its centers the uranium needed for building the bomb. It can be hidden anywhere." If our honorable foreign minister examines this in the light of his military experience, he will realize that India has gone beyond the limit of merely attacking Kahuta. Now it has got the option of attacking any place. All it has to say is that "in this place there was a store of bomb-grade uranium." Now the danger is not merely of an attack on Kahuta. Very skillfully India first started the atom bomb campaign and now, in this context, it has made all of Pakistan the target of its attack. Modern battles are fought on the political front. India has cleverly played the card of a Pakistani atom bomb. Now if it wants to embark on aggression, then Mr Rajiv Gandhi has already won half the battle through his political moves. He has obtained an agreement on the principle of stopping Pakistan from building an atom bomb and, interestingly enough, America has reverted to the position of 1971. Then it accepted secession of East Pakistan. Only on the means did it have differences with India. Today, it accepts the principle of stopping Pakistan from building an atomic bomb. Today, too, the differences are only over means. In my opinion, the differences today are much narrower than in 1971.

In this context, that innocent remark by Mr Rajiv Gandhi is meaningless where, while expressing his amazement, he stated: "President Reagan said to me that you should stop Pakistan from building an atom bomb before the Pakistani atomic program reaches a point of no return." Rajiv Gandhi said, "I do not understand what the President meant by this." One cannot help applauding the cleverness of this innocence. Full of warning as the remark was, more dangerous were the explanations offered by America. The remark was made by President Reagan on a personal level with the administrative head of India, but the explanations have been issued on lower official levels. Even these explanations do not deny the remark. Only the interpretations are said to be different. In other words, there is no dispute at all over "stopping Pakistan." In a recent issue of THE NEW YORK TIMES, the above remark by President Reagan is presented like this: "We must not allow Pakistan to reach a stage from which it is not possible to come back." These remarks are by the American president. There is no question that India will have any disagreement with this. This agreement between these two powers can become the basis of a big step.

If, according to THE NEW YORK TIMES, even officials of President Reagan's administration know that Pakistan is not building an atom bomb, then why is the American government becoming a party to this "bomb campaign"? The answer to this is very simple. Pakistan is not in the list of permanent interests of America. These regions start from west of the [Persian] Gulf. Israel is the center of American interests in the region. There is no doubt that Pakistan has acquired enough capability and expertise in the atomic field. If not today then tomorrow, if a political decision is taken, our scientists are in a position to deliver a bomb. A Pakistan atom bomb is a death knell for Israel. America will not court this danger under any circumstances. The American concern is that, taking advantage of the present conditions, guarantees should be obtained that Pakistan will never be able to build a bomb in the future and, in case it does want to build the bomb, the big powers should have the right to stop it by force. This is a serious conspiracy against Pakistan. This is a bigger conspiracy than even the effort to destroy the reprocessing plant. This plan is obviously in accordance with the wishes of India. That is why it started the bomb campaign. It is not too farfetched to believe that India may have obtained American consent before starting this campaign. This suspicion is not misplaced. The final question is whether, to prevent Pakistan from building an atomic bomb, world intimidation will be brought to bear to shackle Pakistan to agreements or force will also be used. Here there may be a difference between the positions of America and India. It may be that America hopes, by making Pakistan friendless in the world, to scare it into accepting any kind of agreements to go without an atom bomb. Obviously, it is also China's interest that, under the influence of the idea of a bomb-free zone, an idea that has emerged in the course of this controversy, India may provide world guarantees for not building an atom bomb. This should be its natural reaction. But there is no salvation in this for Pakistan. Keeping in view its claims of friendship, we can accept that America wants to limit the "bomb campaign" merely to pressure us so that Pakistan will accept atomic restrictions forever. But will this be the objective of India also? It is difficult to believe this. India feels that in view of the atmosphere created as a result of the "bomb campaign" it will not face any significant opposition if it takes steps to destroy Pakistan's military power under cover of knocking out atom bomb installations. This impression is fraught with dangers. In view of India's mentality, there is lot of temptation in this. It should be kept in mind that in 1971 Mrs Gandhi had given orders to the military commanders that "military power in West Pakistan should also be destroyed." A friendly ambassador had accordingly passed it on. This action was stopped as a result of a telephone call from President Brezhnev. But, today, conditions are different. America agrees with the basis for attack which India has created. And how are our relations with Moscow? It will be enough to note that until 1971 Moscow had never accused Pakistan of killing any Soviet soldier. From this, one can realize what kind of dangers are threatening the country. The conspiracy to finish Pakistan's atomic option once and for all is now complete. America wants to achieve this objective without destroying Pakistan's military power. India will definitely wish otherwise. On the basic objective, both are in agreement.

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POSSIBILITIES OF INDIAN ATTACK ON KAHUTA DISMISSED

Lahore NAWA-I-WAQT in Urdu 16 Nov 85 p 3

/Article by Abuzar Ghaffari: "Danger to Kahuta Atomic Plant!"/

/Excerpt/ India has to consider several facts before an attack on Kahuta. First, the target is very crucial and must be aimed at carefully. The Indian Air Force must attack during daylight time. An air attack at night will not be effective. It is essential to fly low for a daytime air raid. It means that Indian airplanes must fly low when attacking the atomic plant at Kahuta. In June 1981, when Israel attacked and destroyed the atomic plant in Baghdad, the writer of these lines was in Baghdad after observing the conference of Islamic Foreign Ministers. The Israeli attack began just before sunset and was over in a few minutes. Iraq had never even imagined that Israel would attack their atomic plant. This attack was so unexpected that Iraq neither used any antiaircraft missiles nor sent any airplanes to ward off the attack. When the Israeli airplanes had returned after completing the mission, Iraqi antiaircraft artillery began to fire heavily. The strength of this firing clearly indicated that, had they fired in time, the Israeli mission would never have been successful.

Thus, India must assure that its air attack on Kahuta is so sudden that the Pakistan Air Force does not have time to defend it. The Indian desire to attack Kahuta is so well known that Pakistan has already taken necessary defensive measures. The selection of the hilly site in Kahuta was made for defense reasons. Pakistan is confident of defending its atomic plants. Narsimha Rao, India's foreign minister, had announced on 12 December 1980 when Breheznev was visiting India that according to news reports Pakistan was making atomic weapons. He had added that India was taking steps to protect itself. In response, President Ziaul Haq had said at Bahrain on 18 January 1981 that Pakistan has the ability to defend its nuclear plants and it is willing to accept India's challenge. We can assume that it is not possible for India to attack Kahuta.

India will lose heavily if its attack is not a surprise. Even if Indian airplanes manage to reach Kahuta by flying low to avoid detection by Pakistan's radars, they must fly high to cross the mountains near Kahuta. At that time they will fall prey to Pakistan's antiaircraft artillery. India knows this and has never dared to attack Kahuta despite its repeated threats. India will be greatly humiliated if its attack on Kahuta fails. Also, Western countries, especially the United States, will stop providing technical assistance to India.

The second reason that deters India from attacking Kahuta is that such an attack would have widespread implications. There were fears of an Indian attack on Kahuta and /Pakistani-held/ Kashmir when Indira Gandhi declared on 11 December 1981 that situations similar to 1971 had developed on their borders. General Zia told newspaper editors on 1 January 1981 that there would be a large-scale war if a superpower tried to pressure Pakistan via Afghanistan or used another country to make trouble on our borders or attack our atomic plants. He said that people who wanted to destroy Pakistan before it got F-16 fighters from the United States were hoping for too much. He added that Pakistan was no weakling and could defend itself. This was a clear message to India. If India makes trouble in Kashmir or attacks Kahuta under pressure from the USSR, Pakistan would go to a full-scale war. Recently, on 29 October 1985, Foreign Minister Sahabzada Yaqub Khan declared in the Senate that an Indian attack on the Kahuta atomic plant will be considered a full-scale declaration of war. He assured that Pakistan has taken necessary steps to defend Kahuta and will retailiate against an Indian attack with full force.

Actually our president's declaration that an Indian air raid on Kahuta would be considered an attack on the whole of Pakistan has put India in a difficult situation. India is aware that it must be prepared to wage war with Pakistan before it dares to attack Kahuta. India is not ready for that now. As mentioned earlier, India was hoping that, after the Russian takeover of Afghanistan, Pakistan with the majority of its armed forces stationed on its western border would leave its eastern borders open for easy annexation by Indian Armed Forces. The Ayghan mujahidin, however, by keeping the Karmel armies away from the Pakistani borders, have poured cold water on Indian designs. By protecting the Afghan-Pakistan border, the Afghan mujahidin have made it possible for Pakistan to reserve its whole armed forces for an attack by India. Now it is not possible for India to destroy the Pakistani Army in a few days. General Zia is correct in his statement that the Afghan mujahidin are fighting Pakistan's war. An Indo-Pakistani war will force the two superpowers to join in and will result in the third world war. India is aware that Pakistan can take advantage of the Sikh unrest in Punjab and help establish Khalistan and that Kashmiri Muslims might rebel against India. The third reason why India will not attack Kahuta is the fact that Pakistan is a strategic ally of the United States. The United States will never allow its important ally to suffer heavy casualties or embarrassment. The United States considers an Indian attack on Kahuta as a challenge to itself because it is aware of the Soviet interest and hand in such an attack. Therefore, it is in the U.S. interest to stop a Soviet or Indian attack on Kahuta. The United States' decision to help Pakistan with atomic technology has disturbed Rajiv Gandhi very much. It was said that President Reagan was concerned about Pakistan's atomic program when Rajiv Gandhi visited the United States in June 1985. He was supposed to pressure Pakistan not to make an atomic bomb. When Rajiv went to New York last October to tell that Pakistan has already made an atomic bomb, the President told him that Pakistan had no atomic program and advised him to negotiate with Pakistan directly on this issue. The Indian prime minister believes that the United States is aware that Pakistan has an atomic bomb, but does not want to discuss it.

We are glad to learn that, finally, Rajiv Gandhi knows that the United States will help Pakistan at all costs. Now, before attacking Kahuta with Soviet help, India has to think what steps the United States will take to help Pakistan. Pakistan and the United States know how the Soviet AWACS airplanes had made the Pakistan Air Force totally ineffective. We have made necessary arrangements to ensure that the USSR does not jam our radars. This would be an electronic war and the United States is bound to win it. The United States will also monitor Indian airplanes from its satellites. Just before Mrs Gandhi was assassinated India had moved some of its Jaguar fighter planes from one base to another. U.S. satellites observed this movement and the discussion that followed in the U.S. Senate was heard all over the world. The CIA is also of great help in informing us of Indian designs and plans.

The people in the United States will be greatly upset with India if India decides to attack Pakistan since President Reagan has told Rajiv Gandhi to negotiate directly with Pakistan to stop nuclear proliferation in the subcontinent. At the same time Rajiv Gandhi's campaign to obtain modern technology will fail badly. The United States and other industrialized countries in the free world will refuse to help India with modern technology. The U.S. offer of super computer technology to India is very important. President Reagan is offering this high technology to India, but at a price. India has to promise not to attack Pakistan so the latter can focus its energies on the danger posed by the Soviet Union.

The fourth reason why India will not attack Kahuta is the possible hazard to citizens in Rawalpindi and Islamabad if the nuclear plant is damaged. The destruction caused in the embassy row in Islamabad by nuclear dust would make world headlines. India also knows that if it hurt Pakistani people with an atomic bomb, Pakistan is capable of doing the same to its citizens.

The fifth reason is that Pakistan can also attack Indian atomic plants. India could attack Pakistan and not fear retaliation before the arrival of F-16 bombers. The situation changed when these planes arrived in Pakistan in October 1982. Now India knows that if it attacks the Pakistani atomic plant Pakistan will do the same. India's atomic plants near Bombay are within the range of F-16 airplanes.

Now, if India attacks Kahuta with help from Israel, we will say that Pakistan is not Iraq. At this time when Pakistan is fully prepared, the question of an Indo-Israeli air raid just does not arise.

7997/12228
CSO: 5100/4724

PAKISTAN

BRIEFS

CANADA TO END NUCLEAR FUEL SUPPLIES--Islamabad, 21 Dec (AFP)--Canadian Foreign Minister Joe Clark said here today that his country would not resume nuclear fuel supplies to Pakistan. After talks with Pakistani officials during a three-day visit here, Mr Clark told a news conference that Islamabad did not seem ready to adhere to Canada's "strict standards" for nuclear cooperation. Canada had agreed to supply fuel to the Karachi nuclear power project, but changed the standards for such cooperation after India exploded a nuclear device in May 1974. The nuclear cooperation agreement between the two countries ended in 1976, when Pakistan refused to allow Canada access to all of its nuclear facilities. But Mr Clark said Canadian aid for the development of conventional energy resources would continue. Today, he signed an 80 million Canadian dollar (59 million U.S. dollar) assistance programme to increase production at the Tarbela Dam project, 70 kilometers (44 miles) northwest of here. He also pledged Canada's continued support to Pakistan on the Afghanistan issue and relief assistance for displaced Afghans. [Text] [Paris AFP in English 1800 GMT 21 Dec 85 NC] /9274

CSO: 5100/4730

IVORY COAST

BRIEFS

HOUPHOUET RECEIVES IAEA DIRECTOR--President Felix Houphouet-Boigny yesterday granted an audience to Dr Hans Blix, director of the International Atomic Energy Agency [IAEA] who explained to the head of state that apart from the fabrication of bombs, the IAEA can contribute to the development of agriculture and preserve products [preserver les productions] from all calamities. This was why Dr Hans Blix made it a point to pay courtesy visits to the ministers of rural development and agriculture. He also visited the university laboratory of nuclear sciences at Cocody and the laboratory of animal nutrition. [Text] [Abidjan FRATERNITE MATIN in French 15 Jan 86 p 6] /8309

CSO: 5100/12

SENEGAL

BRIEFS

DISCUSSION ON NUCLEAR ENERGY--Dakar, 10 Jan (AFP)--Hans Blix, director of the International Atomic Energy Agency (IAEA) said in Dakar that Africa would have made a great step toward denuclearization if Pretoria had agreed to the verification of its nuclear energy installations. Mr Blix stated this to the SENEGALESE NEWS AGENCY after he had been received in audience by the Senegalese head of state, who is also the current chairman of the OAU. The director of IAEA, who is on a 3-day official visit to Senegal, disclosed that he discussed with President Diouf ways and means of developing cooperation between the IAEA and developing countries for the use of nuclear energy for peaceful purposes. The IAEA currently cooperates with Senegalese Nuclear Technology and Agricultural Research Institute. [Text] [Paris AFP in French 1745 GMT 10 Jan 86] /8309

CSO: 5100/11

ANATOLIY GROMYKO ON CONTROL OF NUCLEAR THREAT

Moscow IZVESTIYA in Russian 10 Aug 85 p 5

[Article by Anatoliy Gromyko, corresponding member of USSR Academy of Sciences: "Kill the Nuclear Leviathan!"]

[Text] In today's world, a world that is well informed about the possible calamities of the thermonuclear catastrophe, there has been born, as though all by itself, the reassuring idea that no governmental leader will risk beginning a nuclear war, and the arising of such a war is possible only as a result of a fatal error or accident. But even the latter is completely inadmissible. Putting it more briefly, in Washington and the NATO capitals many extremely respectable people seem to be convinced that the only thing to be feared is a short circuit in a computer or a terrorist acting on his own. But what if the "short circuit" occurs in the head of one of those persons who has been invested with the right to use nuclear weapons?

The proliferation of nuclear weapons is sometimes felt to be inseparable from scientific-technical progress. People at such time forget that the twentieth century, which crowned the heights of the achievements of human intelligence with avalanches of nuclear danger that are ready at any moment to come crashing down on people, has posed in all its fullness one of the key questions of civilization -- the question of the moral preparation of man for his constantly expanding transformational capabilities.

People recall, in particular, the words which the leading natural scientist, Academician V. I. Vernardskiy expressed at the very beginning of the 1920's. Looking with bright hope and simultaneously a large amount of alarm at the still scarcely distinguishable contours of the future Atomic Age, he said, "We are approaching a great turning point in the life of mankind, with which none of the ones that have been previously experienced can be compared. The time is not far off when man will get in his hands atomic energy, that source of power which will give him the capabilities of building his life the way he wants it. That can happen within the next few years, or it can happen within a century. But it is clear that this must be. Will man be able to take advantage of that force, to channel it toward that which is good, rather than toward self-annihilation? Has he grown to the point of knowing how to use that force that science must inevitably give him?"

Unfortunately, not all of mankind has proven to be morally prepared to receive nuclear energy in its hands. Less than a quarter of a century separated V. I. Vernadskiy's prophetic words from the nuclear explosions at Hiroshima and Nagasaki.

A new natural law is taking on decisive importance in international relations at the end of the twentieth century. One cannot achieve a unilateral advantage for oneself to the detriment of the security of others, and without in the final analysis also inflicting harm on oneself. This natural law was well understood by the most far-sighted and sober-minded contemporaries of the dawn of the Nuclear Age, or in any case by those whose minds had not been captured by various kinds of concepts of strength.

By no means everyone, however, realized that the appearance of mass destruction weapons of a force that threatens to become uncontrollable changes not only the role of those weapons and the attitude toward a war that employs them, but also the definition of the priorities in the sphere of the major concerns of mankind. To the fullest degree this manifested itself in the course of the "nuclear arms race," the entire history of which became a brilliant testimony to the futility of the attempts to guarantee security at the expense of military superiority. Every time that the United States attempted to achieve unilateral advantages by means of developing new types of weapons and making them standard equipment, they forced the Soviet Union to take retaliatory measures. As a result the spiral of the arms race took a new and more dangerous twist, and kept developing more and more sharply along the vertical.

It is improper to equate the special responsibility borne by the countries possessing nuclear weapons for the fates of the world with the "equal responsibility" borne by those countries for the heating up of the international tension. The USSR bears no responsibility for the latter, because if one follows that "logic" one could also, with a serious appearance, place the equal sign between the scientists who discovered atomic energy and the American political figures who made the decision to carry out the nuclear bombings. The world has not forgotten the specific political situation in which that sinister decision was once made.

Nuclear weapons were used by the United States against Japan under extremely strange circumstances. Their use was not justified by military goals. By that time militaristic Japan had been substantially defeated, including the situation in which, by the strength of Soviet weapons, its very powerful Kwantung Army had been forced to surrender. By dropping atom bombs on Hiroshima and Nagasaki, Truman and those surrounding him were, as it were, hurrying to announce to the entire world, but primarily the Soviet Union, their monopoly with this terrible supermurderer weapon. The existence of atomic weapons, in their opinion, was supposed to guarantee for them a special role as "military leader." That was moral degradation.

Attempting to shake off from themselves the terror inspired by the principle of "balance of fear," substantiated by the hypothesis that, in the event of nuclear attack, the other side would still have sufficient means for a retaliatory annihilating strike, the "nuclear optimists" have not found anything better than to talk about the inflicting of a "decapitating" strike or the waging of a "limited," "prolonged" nuclear war. It is assumed that the European theater of military actions can become its arena. At such time, however, they remain silent about the fact that the idea concerning the "limited" application of nuclear weapons in Europe can be extended to other regional crisis situations.

There exists an aphorism that "A pessimist is a well-informed optimist." I do not think that "nuclear optimism" has any shortage of information. We are dealing, rather, with something else. We are dealing with the attempts to disregard the data that scientists already have at their disposal concerning the pernicious effect that nuclear war can have on the climate of the earth and its ecology.

The danger of the escalation of the nuclear arms race is growing not only as newer and newer systems appear, and one observes, so to speak, the maturation of the material prerequisites for the horizontal proliferation of those arms. The danger is linked in the most direct manner with the very spirit of the arms race, with the existence of the philosophy of nuclear intimidation.

Literally from the moment of the creation and application of the first atomic bomb, at all stages of the acceptance as standard equipment of new systems of nuclear weapons, and ending with the very latest ones -- the U.S. "strategic defense initiative" that stipulates the further militarization of space -- the nuclear race has been justified, and is still being justified, by NATO by the "concern" for the preservation of the peace. It is sad, or even tragic, that the illusion of the possibility of guaranteeing peace and security under a "nuclear umbrella" is still being disseminated much more rapidly than even the nuclear weapons themselves, and is becoming, in the final analysis, a narcotic impetus that encourages certain countries to enter the "nuclear club."

The appearance in new countries of several, or even dozens of, nuclear warheads and the means of delivering them is complicating the monitoring of nuclear weapons, and is increasing on a global scale the factor of indefiniteness and the increase in the distrust and the reciprocal suspicions in international relations, and, I would say, will subject to additional strain the "nerve system" of nuclear policy, which has already been strained to the limit.

Serious concern is also caused by the attempts to undermine the existing conditions to prevent the proliferation of nuclear weapons. Thus, despite the principles stated in the Nuclear Nonproliferation Treaty, the nuclear powers of the West have discontinued their negotiations with the USSR concerning the complete and universal banning of nuclear arms tests. Such governments as the Republic of South Africa, Israel, and Pakistan, with the short-sighted support of the Western countries, and primarily the United States, are attempting with special stubbornness to break through the breaches in the system of measures that are aimed at the nonproliferation of nuclear weapons.

A no less serious blow at the antiproliferation conditions is being dealt by the deploying by the United States and NATO of mass destruction weapons and the meaning of delivering them outside the confines of their own territory.

The military activity of the United States and the other NATO powers, which has caused a retaliatory reaction from the USSR and the OVD [Warsaw Pact Organization] in defending their security, is a serious obstacle on the path of creating nuclear-free zones that could become an effective means of reinforcing the idea and practice of nonproliferation.

The U.S. plans to saturate space with weapons are raising the arms race to a qualitatively new level, that defines the direct interrelationship between nuclear weapons "along the vertical" and its proliferation "along the horizontal." Already, at the stage that is called by the American representatives the "stage of scientific-technical developments," the United States is attempting to involve in the preparation of a war in space not only its NATO allies, but also countries that are directly located in the zone of real armed conflicts. It is extremely indicative that Israel was one of the first countries to declare its readiness to fasten itself closely to the "Star Wars" plans. In addition, although the "Star Wars" program is taking only its first steps, it is already, essentially speaking, causing a fever throughout the world, leading to the destabilization of global international relations, and sharply aggravating the political and military confrontation.

There is just one way out of the critical situation that has been created -- the cessation of the arms race and the transferral of the liberated funds to meet the needs of universal development. It is only a policy of peaceful coexistence with various socioeconomic systems that is the sole intelligent formula for international relations. It is necessary for countries to learn how to live not against one another, but with one another.

The refusal to use force as the absolutely fundamental principle of modern international relations presupposes the further increase in the foreign-political activity of absolutely all the countries in the world, irrespective of their economic potential or military might. In the person of six countries -- Argentina, Mexico, India, Thailand, Greece, and Sweden -- which came out with a joint declaration in May 1984 which called for the complete cessation of the development, production, and deployment of nuclear weapons and means of delivering them, for the freezing of the nuclear arsenals, and the initiation of steps to reduce them, we see realists in the struggle to improve the international situation.

A tremendous role in this matter is played by the decision of the Soviet Union on a unilateral basis to discontinue any nuclear explosions starting on 6 August 1985. The joining in of the United States in this wise action, as General Secretary of the CPSU Central Committee M. S. Gorbachev noted, would be an important contribution to the reinforcement of the strategic stability and peace on earth.

There are, unfortunately, figures who feel that every generation must travel its own path of trial and error, must experience, so to speak, history with its own life. They assert that there are things a bit more important than peace. I am afraid that for the nuclear age this view is hopelessly obsolete and it would seem that there will no longer be anyone to learn from the errors that our generation is taking the risk of making.

Do the NATO political figures, and primarily those of the United States, have sufficient wisdom and bravery to stop the vertical growth of the nuclear arms race and to close off the channels of its proliferation along the horizontal? That is a question not of academic curiosity. Its resolution will determine the fate of mankind as a whole and the fate of every person individually.

Biblical mythology mentions Leviathan as a terrible monster that was hostile to God and that was smitten by the Almighty. That gigantic snake embodied the destructive forces. It is no accident that in his monstrous jaws the great painter El Greco saw the gates of Hell, and depicted them in one of his apocalyptic paintings.

Today our world is being torn apart and is being threatened with destruction by a nuclear Leviathan that is being nurtured by greedy militarism. In order to prevent this from happening, it must be bridled and killed. And in real life this can be done only by people, by their intelligence and their deeds.

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CSO: 5100/1

CEMA NUCLEAR ELECTRIC POWER, HEAT PRODUCTION

Technical Aspects, History of CEMA Nuclear Cooperation

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 9, Sep 85 pp 12-16

[Article by Andranik Petrosyants, chairman of the USSR State Committee for Utilization of Atomic Energy, chairman of the CEMA Permanent Commission for Peaceful Uses of Atomic Energy; and Aleksandr Panasenkov, CEMA Secretariat department chief; under the rubric "Integration in Action": "The Atom's Energy--for Creation"]

[Text] The SEV [CEMA] Permanent Commission for Cooperation in the Area of Using Atomic Energy for Peaceful Purposes, created by the council session in 1960, is marking its 25th anniversary. As is indicated in the commission's regulations, its task is comprehensive examination and solution of the most important multilateral cooperation problems in the given area, foreseen by the Comprehensive Program of Socialist Economic Integration, through long-term special-purpose [ad hoc] cooperation programs, and integrated measures in the areas of energy, fuel and raw materials.

All CEMA member countries, except the Mongolian People's Republic [MNR], participate in the commission's activity. Yugoslavia takes part in its work on individual matters of mutual interest.

I

In the commission's first decade (1960-1970), attention was concentrated upon developing national scientific research centers, in which nuclear reactors and charged-particle accelerators were installed, and constructing physics and radiochemistry laboratories outfitted with modern equipment. The training of scientific and engineering personnel played a special part during this period.

Creation of large experimental bases and test facilities, as well as initiation of nuclear electric power plant [AES] construction, furthered expansion of the cooperation within the commission's purview on many problems--equipping thermal and fast-neutron atomic reactors, nuclear instrument manufacturing, radiation protection equipment, reprocessing fuel irradiated in reactors, detoxifying and burying radioactive waste materials, technology for obtaining radioactive isotopes, using radioisotope equipment, transporting radioactive materials, ensuring radiation safety when using atomic energy, and others.

Working agencies of the commission, which launched their activity on the basis of the coordination plans for scientific research and technical developments, were formed after adoption of the comprehensive program.

During the 25 years, 1,550 questions on urgent cooperation problems have been examined by the commission and its agencies, and about 700 measures, in which over 27,000 specialists took part, have been carried out.

The formation, by commission decision, of a number of international organizations (economic associations, scientific collectives, representative councils, and others), operating on the basis of appropriate agreements, played an important part in broadening cooperation.

The International Economic Association for Cooperation in Nuclear Instrument Making [Interatominstrument], created in 1972 on the commission's initiative, has done much work in organizing the specialized production of instruments and nuclear equipment items. An agreement, effective within the association's purview at the present time, provides for division of labor in the output of 187 kinds of articles, which are included in 17 nomenclatural groups. Specialized production's share in the overall goods-turnover volume of the international economic association [MKhO] exceeds 50 percent, which amounts to about 50 million exchange rubles per annum. The association has been operating on a self-sustaining economic basis since 1978, due to revenues from the sale of administrative contracts and the services of its branches in the People's Republic of Bulgaria [NRB], Polish People's Republic [PNR], and USSR.

An agreement on multilateral international specialization and cooperative amalgamation in the manufacture of isotope-production articles, signed in 1974 between the Hungarian People's Republic [VNR], German Democratic Republic [GDR], PNR, Socialist Republic of Romania [SRR], USSR, and Czechoslovak Socialist Republic [CSSR], has permitted ensuring the production of a wide range of radioactive and stable isotopes, ionizing radiation sources, tracer preparations for medical purposes, and others.

Today the agreement's product list encompasses products of about 1,500 kinds. Their quality is being steadily improved. The volumes of reciprocal deliveries are increasing. The agreement will be extended for the third time--to cover the years 1986-1990.

A temporary international collective (VMK) of scientists and specialists in the physics of reactors of the VVER [water-moderated, water-cooled nuclear power reactor] type has been operating in Budapest since 1972. Specialists from nine CEMA member countries, as well as Finland, participate in its work. An experimental zero-power reactor has been constructed, under administration of the VNR Academy of Sciences Central Institute for Physics Research [TsIFI], for conducting the joint work.

During the VMK's time of operation, uniform programs have been created for the physics calculations of reactors and the metrology of measurements in their start-up and use in an AES. Characteristics of the fuel assembly lattices are being investigated, a series of steps is being taken to optimize nuclear fuel overloads, and new methods of VVER core diagnosis are being developed for introduction into AES's.

II

As is well known, one of the main ways of increasing a national economy's effectiveness is efficient use of energy resources. The brother countries are solving this problem, first of all, through accelerated development of the atomic power industry on the basis of united efforts. And here is the result. At present, the total capacity of AES's operating in Bulgaria, Hungary, the USSR, the GDR, and Czechoslovakia amounts to more than 30,000 megawatts; including 1,760 megawatts in the NRB, 880 in the VNR, 1,830 in the GDR, over 25,000 in the USSR, and 1,760 megawatts in the CSSR. The generation of electric power at these AES's has reached approximately 180 billion kilowatt-hours, which is equivalent to the saving of about 60 million tons of conventional fuel.

According to the industry's development plans, the total capacity of AES's in CEMA member countries will amount to about 40 million kilowatts in 1985. The generation of electric energy at them will exceed 230 billion kilowatt-hours, which, in tentative calculation, will permit the replacement of 70 million tons of fossil fuel. It is expected that the total capacity of AES's will reach 100 million kilowatts during the next 10 years. Their contribution to electric energy production in the individual countries will constitute 20-30 percent, but over 40 percent in the NRB.

Today, the atomic power industry in the majority of CEMA member countries is being developed on the basis of series-produced, water-moderated, water-cooled power reactors of 440 and 1,000 megawatt capacities. In the USSR, channeled boiling-water reactors with graphite moderator (RBMK's) of 1,000 and 1,500 megawatts also have received development.

To date, 24 units [bloka] with VVER-440 [440 megawatt VVER] are in operation in CEMA member countries; including 4 units at the Kozloduy AES in the NRB, 2 at the Paks AES in the VNR, 4 at the Bruno (Leuschner) AES in the GDR, 10 at the Novovoronezhskiy, Kola, Rovno and Armyansk AES's in the USSR, and 3 units at the (Bogunice) AES and 1 at the (Dukovany) AES in the CSSR. Through 1990, it is proposed to bring about 20 more units with VVER-440 into operation in the VNR, GDR, Republic of Cuba, PNR, USSR and CSSR.

The experience in operating an AES with these reactors shows that they are reliable sources of electric energy production. The AES's cost of production, despite the higher capital outlays, is lower in this case than at a TES [thermal electric power plant] using fossil fuel.

The next stage in atomic power industry development is associated with launching the construction of AES's with reactors of 1,000 megawatt capacity. Their placing in operation will permit increasing capacities at higher rates, with simultaneous reduction in the proportional outlays of metal, building materials, and fuel. The first AES's with VVER-1000 already are operating in the USSR. Construction of the lead unit with a reactor of this type is being completed in the NRB. Construction agreements for such AES's have been concluded in the GDR, SRR, and CSSR. In the future, these will be drawn up in other CEMA member countries as well.

Taking the important meaning of the VVER-1000's into account, CEMA member countries signed an agreement, in 1980, on mastering and further improving them. On its basis, physics and thermohydraulics research has been organized, as well as research on ensuring safety; and new kinds of equipment and technological and operating rules are being developed. Among these, the following have special significance:

A diagnostic system for inspecting the condition of the VVER core and equipment in the process of AES operation, which got its "start in life" through the joint efforts of four countries (VNR, GDR, USSR and CSSR) (It was awarded the Leipzig Fair's Gold Medal in 1984);

a large heat-extraction loop installation [includes pump, steam generator, piping from and to reactor, etc.] for conducting joint work on safety of reactors at the "Mariya" experimental nuclear reactor in the PNR;

investigation of the heat-exchange crisis and heat-engineering safety of VVER-type reactors being carried out in the VNR, USSR and CSSR on large thermohydraulics test stands;

creation and manufacture of prototypes for a modernized, stepwise actuator of the control and protection system (SUZ) for VVER-1000's, as well as issuance of the technical documentation for putting these into series production, in the USSR and CSSR.

At the suggestion of our committee, the Intergovernmental Commission (MPK) for Cooperation in Producing Equipment for Nuclear Electric Power Plants made the decision, in 1983, that all new kinds of equipment and devices would be turned over to the MPK for organizing their specialized production, taking into account the contributions of individual countries in their development.

III

As they gain experience, it also is intended to organize cooperation of interested countries in the use of nuclear fuel for centralized heat supply. At present, by CEMA Executive Committee decision, draft agreements and cooperation programs for CEMA member countries are being developed within the purview of the CEMA Permanent Commissions for Cooperation in the Area of Electric Power and the Area of Using Atomic Energy for Peaceful Purposes in scientific and technical and planning work in the area of atomic heat and electric power centers (ATETs's) and atomic heat supply plants (AST's). In accordance with directives of the Higher Level Economic Conference, a decision has been made by the executive committee on developing AES and AST construction programs in CEMA member countries to the year 2000.

Introducing nuclear sources for generating electric energy and heat will lead to expansion of the industry's fuel base. In this respect, the development of fast-neutron reactors acquires particular significance.

At present, in the USSR, a prototype industrial AES with reactor BN-350 [fast-neutron nuclear power reactor of 350 megawatt capacity] is operating in the city of Shevchenko, and a BN-600 is operating at the Beloyarsk [or Beloyarskiy] AES.

In the next decade, efforts in the USSR will be centered upon reactor BN-800, which is, essentially, a modification of BN-600, and development of the next generation--BN-1600, combining great economy in electric energy production and good nuclear-fuel breeding characteristics.

Many CEMA member countries are interested in fast reactors. Therefore, cooperation among the brother countries already has been developing in this matter for 13 years. Joint activity permits accelerating the development of large, economical, industrial kinds of power equipment. Specialists of the NRB, VNR, GDR, PNR, SRR, USSR and CSSR are taking part in this work.

Attaching great significance to it, CEMA member countries, in 1980, signed an agreement on scientific and technical cooperation. Conducting both physics and thermohydraulics research and research on safety, and developing certain kinds of equipment and instruments through joint efforts, are envisaged by the cooperation program. A number of important results has been obtained in the course of carrying out the program. In the CSSR, for example, modular-type steam generators for fast-neutron reactors have been manufactured. In other CEMA member countries, the accessories and industrial instruments for checking on impurities in sodium, and many other kinds of the latest equipment, have been developed.

IV

As is well known, the development of the atomic power industry is inseparably linked to improvement in the fuel cycle.

Here, the cooperation of CEMA member countries is concentrated upon radiochemical reprocessing of irradiated fuel, its transporting, and processing and burying waste materials. It is aimed at further increasing the industry's economizing, concentrating waste materials, and ensuring maximum radiation safety.

The fact is, that the planned scales of AES construction will give rise to the need for transporting a substantial quantity of spent fuel. In this regard, the cooperation of CEMA member countries has, as its purpose, both the creation of special means of transport, and the development of standard international legal documents regulating transport matters.

At present, a great deal of work has been done on designing and standardizing these means, and on creating special packaging outfits for safe transport of spent nuclear fuel from AES's with VVER-type reactors. These meet the requirements for mechanical and thermal stability, airtightness, and radiation and nuclear safety. The technical conditions for gathering up TVEL's [fuel elements] from AES's with VVER-440 for transport by railroad or waterway also have been prepared.

An important result of the cooperation--the Regulations for Safe Transport of Spent Nuclear Fuel from AES's.

In CEMA member countries, the problems of providing AES's with fresh fuel, and its subsequent reprocessing, are resolved by agreement of the parties. The Soviet Union carries out the isotopic enrichment of uranium, manufactures and delivers to the countries concerned the heat-releasing [fuel element] assemblies for AES's, and accepts the spent nuclear fuel for regeneration. This is economically advantageous to all participating countries, and permits ensuring concentration of the highly [radio]active waste materials in a limited number of places.

Efficient and safe detoxification of radioactive waste materials formed in the process of AES operation is the determining factor in accelerated development of the atomic power industry. Therefore, research in the area of processing and burying radioactive waste materials occupies, today, one of the important positions in the brother countries' cooperation. A number of methods documents has been prepared by the commission for successful solution of this problem.

Great attention is devoted to burying radioactive waste materials in geological formations--surface strata; deep, water-saturated beds; and salt formations. Extensive theoretical, laboratory, field and experimental industrial research has been conducted along these lines. The fundamental designs of underground depositories, taking into account a region's hydrogeological conditions and the composition and volume of the waste materials, have been developed. On the agenda is preparing standard technological plans for detoxifying the radioactive waste materials of AES's with VVER-440 and VVER-1000, ATETs's and AST's, and developing industrial equipment for processing, hardening and burying these.

V

The commission devotes great attention to the development of nuclear instrument making. Within its purview, an analysis has been made of the state of the devices' development and production prior to 1980, and the trends to 1990, and proposals have been prepared for selecting a uniform, mainline modular system. Work has been organized on obtaining the devices for monitoring and controlling power reactors, monitoring AES radiation safety, and others.

By commission decision, all CEMA materials and standards for nuclear physics instruments, medical devices, KAMAK [not further identified] system units (modules), etc., are to be sent to the Interatominstrument MKhO for the organization of specialized production.

Steps, aimed at ensuring the radiation safety of nuclear power installations, are being taken within the multilateral cooperation's framework. Uniform criteria for optimatizing the amount of dosimetric monitoring of the environment in the vicinity of an AES location, as well as at the burying sites for radioactive waste materials, have been agreed upon. The effect of AES emissions and discharges on the radiation situation in large ecological systems is being studied in detail. Results of the research attest to the high degree of AES safety.

The legal bases of safe atomic energy use are being strengthened. Cooperation in this area is receiving steady development among CEMA member countries, as well as between them and other countries and international organizations, which is appropriate to the open character of the Council for Mutual Economic Assistance [CEMA].

Showing a readiness to share many years of experience and knowledge in AES operation, the countries of the socialist alliance are taking an active part, on the basis of equal rights and mutual benefit, in the work being done within the framework of the MAGATE [International Atomic Energy Agency] and other international organizations, and are rendering technical assistance to developing countries. Their motto--Atomic energy should work for creation.

An important direction in the commission's work is the organization of scientific and technical cooperation. At its 34th session (1978), TOKAMAK [not further identified] installations were proposed as the base for CEMA member countries' cooperation in the area of controlled thermonuclear fusion. In November 1979, a program of work for 1980-1990 was adopted. In accordance with it, five bilateral agreements have been signed to date, between the USSR State Committee for Utilization of Atomic Energy and corresponding organizations of the NRB, VNR, GDR, SRR and CSSR. They envisage the uniting of efforts along three lines:

Carrying out scientific research work on existing TOKAMAK installations;

developing, manufacturing, installing and adjusting the separate subassemblies and systems of the TOKAMAK-15 [not further identified] complex, and carrying out joint research on it;

preparing prospective designs of TOKAMAK thermonuclear reactors.

Work on the TOKAMAK-15 is part of the overall INTOR [not further identified] international program for producing the technical design [construction blueprint] for an experimental thermonuclear reactor.

VI

From the very beginning of its work, the commission has attached major significance to applying the achievements of atomic science and technology, not only to the power industry, but also to other national economy sectors.

Already at the commission's first session, in October 1960, decisions were made about organizing cooperation in nuclear instrument making, and in making and applying radioisotopes; and agencies were created, within the purview of which substantial work has been done on uniformity and standardization. Great attention also was devoted to developing specialization and cooperative amalgamation in production.

An important direction in the commission's activity is analyzing ways for effective application of radioisotopic methods and instruments in metallurgy, machine building, geology, construction, the gas and oil producing and refining industry, the chemical industry, gas and oil transporting; the paper, textile, leather, food, and pharmaceutical industries; agriculture, and other industries. Much has been done both for developing and introducing into these industries a wide range of radioisotopic devices for monitoring technological processes.

This has permitted obtaining substantial savings in raw materials, materials and energy, achieving an increase in equipment productivity and product quality, improving working conditions and production know-how, and shortening recovery periods for capital investments. On the whole, the economic impact for 1960-1985, throughout the CEMA member countries, is appraised at approximately 25 billion rubles, with expenditures on development and introduction on the order of 4.5 billion rubles.

The work carried out within the commission's purview has furthered acceleration of the introduction of progressive technologies and devices.

In the NRB, for example, the method of preplanting irradiation of seeds is being applied on a statewide scale for a number of leading grain, vegetable and fodder crops, which permits increasing the yields of tomatoes, peppers, eggplants, corn and alfalfa, and increasing their nutritive value. Various radioisotopic monitoring and control instruments for technological processes have been developed and tested under production conditions, including an automatic, modular microprocessor system with a neutron moisture meter, which makes it possible to automate control over the manufacture of concrete mixtures, improve their quality, and reduce the amount of cement used. In all, about 2,200 units of radioisotopic equipment for various purposes are being operated in the NRB's national economy.

In the VNR, radioisotopic monitoring and control equipment is installed in more than 1,500 technological branches of industrial enterprises. Series production of high-performance medical equipment has been organized.

In the GDR, over 14,000 radioisotopic instruments are in use. Their annual augmentation amounts to approximately 15 percent. A mobile measuring system for radioactive tracer investigations of technological parameters has been developed, and is being used successfully under industrial conditions. A radiometric system for determining the ash content of coal has begun to operate, for the first time in practice, on a prototype conveyor of the TES in (Hagenwerder). With its help, they are succeeding in maintaining the amount of heat being produced per unit of time at a constant level, and thus in optimatizing the process of burning coal and reducing its losses, and in increasing the equipment's k.p.d. [useful operation coefficient].

In the PNR, a variety of radioisotopic equipment for determining level, moistness, density, thickness, weight, concentration, and composition of various substances and materials is being developed and put into series production. Mobile laboratories for industrial radiometric measurements are being used successfully.

In the SRR, the ROKhA-6 roentgenofluorescent substance-composition analyzer, radiometric systems for determining the moistness and heat-producing capacity of coal at a TES, and instruments for determining degree of wear in the linings of blast furnaces have been developed.

In the USSR, a large number of radioisotopic devices has been introduced, ensuring speed, accuracy and continuity of the measurement and automatic monitoring of basic parameters in a wide range of technological processes in the mining, chemical, light and food industries, metallurgy, construction, machine building, etc. A new technology for the radiation modification of wood, natural and synthetic fibers and fabrics, and polymeric and rubber-technology materials has been created. The methods have been fully developed, and the technology optimatized, for radiation processing of produce, which permits achieving substantial increase in the yield of farm crops and the spoilage-protection of raw foods.

In the CSSR, about 5,000 radioisotopic instruments and assemblies have been installed at industrial enterprises. Up-to-date models of accelerators and flaw detectors have been introduced, and the radiation-technology processes for modifying wood and abrasive materials have been mastered.

In all CEMA member countries, the methods and equipment of radioisotopic diagnostics are being applied successfully in medicine, and radiation therapy is being carried out for malignant tumors. In the VNR, GDR, PNR, USSR, and CSSR, the essentially new technology of radiation sterilizing materials and manufactured articles for medical purposes is being applied on industrywide scales, providing for an excellent effect and the full automation of production.

Modern isotopic radiation equipment, coupled with EVM [electronic computer] and microprocessor equipment, constitutes an important trend in scientific and technical progress. Use of these on extensive scales furthers the effective solution of pressing socio-economic development problems.

Forecasting has an important place in the commission's activity. In 1974, the Joint Forecast of CEMA Member Countries' Nuclear Power Industry Development to the Year 1990 was examined and approved by it. This forecast was used in developing a concept of the further development of CEMA member countries' fuel and power base. In 1983, the Forecast of the Development of Basic Directions in the Application of Isotopes and Radiation Equipment in the National Economy to the Year 2000 was approved. At present, a forecast of the technical improvement of VVER-type atomic power installations is being developed.

Ten most important problems, including about 60 subjects, engross scientific and technical cooperation. Some 120 organizations have been recruited for their solution.

At present, the commission is concentrating its attention on carrying out the tasks stemming from decisions of the CEMA Member Countries' Higher Level Economic Conference. This is a matter of changing the structure of power production, and predominant development of the atomic power industry.

Major problems confront the commission in connection with preparing the Comprehensive Program of Scientific and Technical Progress for 15-20 Years, especially its third priority direction--accelerated development of the atomic power industry. The efforts of CEMA member countries and agencies will be aimed at intensive augmentation of power capacities with familiar types of nuclear reactors, and, to this end--at steady introduction of the atomic power industry into the sphere of household and industrial heat supply, development and improvement of all elements of the fuel cycle, and ensuring safe conditions for using atomic energy.

Being an important factor in further progress of the brother countries' economies, the atomic power industry is urged to make a worthy contribution to solving basic problems of the current stage in socialist and communist construction.

Czech-Soviet Cooperation in AES Equipment Production

Moscow EKONOMICHESKOYE SOTRUDNICHESTVO STRAN-CHLENOV SEV in Russian No 9, Sep 85 pp 21-25

[Article by Stanislav Gavel, chairman of the Czechoslovak Commission for Atomic Energy; and Ladislav Molnar, first deputy chairman of the Czechoslovak Commission for Atomic Energy; under the rubric "Integration in Action": "The Nuclear Power Industry: Czechoslovak-Soviet Cooperation"]

[Text] Close cooperation with the Soviet Union in the field of nuclear research has given Czechoslovak scientists, designers and technicians an opportunity to participate in the development of the nuclear power industry since practically its very origin. In April 1985, it had been 30 years since the day of signing the Agreement on the Granting of Technical Assistance to the Czechoslovak Republic by the Union of Soviet Socialist Republics in Developing Research on the Atomic Nucleus, and Using Nuclear Power for the National Economy's Needs. It is noteworthy that the agreement was concluded 1 year after the first atomic electric power plant in the world was brought into operation in the city of Obninsk, near Moscow. This is an excellent example of socialist internationalism's principles in action.

Scientific Research and Technical Base

The Soviet Union gave us assistance as early as during the constructing and equipping of the Institute of Nuclear Physics (today the Institute of Nuclear Research) in the city of (Rzhezh), near Prague, having furnished the basic experimental equipment for it--a research reactor (VVR-S) [water-moderated, water-cooled, non-power nuclear reactor, subtype "S" (Subtype not further identified)], a cyclotron, measuring devices, etc. The Soviet Union also gave us assistance in training specialized personnel. A department of technical and nuclear physics was established in 1955 at Karlova [Charles] University in Prague, but the first Czechoslovak undergraduate and graduate students were sent to the USSR.

In the course of implementing the first intergovernmental agreement between the USSR and the CSSR [Czechoslovak Socialist Republic] in the area of using atomic power for peaceful purposes, not only was substantial assistance provided in creating the Czechoslovak scientific research base, but the foundations also were laid for developing the national nuclear power industry and using radionuclides and ionizing radiation in all areas of the national economy.

The Agreement Between the CSSR and USSR on Constructing the A-1 Atomic Electric Power Plant with Gas-Cooled Reactor, concluded in 1956, was a further step in this direction.

On the threshold of the 1960's-1970's, after reappraising the development concept for the Czechoslovak nuclear power industry, the Intergovernmental Agreement on Cooperation in Constructing Four Units [Bloka] of VVER-440 [440 megawatt water-moderated, water-cooled nuclear power reactor] at the (Yaslovske Bogunice) AES [nuclear electric power plant] was concluded between our countries. Later, similar agreements were concluded on constructing the (Dukovany) and (Mokhovtse) AES's (four units of VVER-440 each). Recently, an agreement has been signed for constructing a (Temelin) AES with four units of VVER-1000 [1,000 megawatt water-moderated, water-cooled nuclear power reactor].

A memorable year for Czechoslovak industry was 1974, when, on the basis of a Soviet Union proposal, we concluded with it the Intergovernmental Agreement on the Specialization and Cooperative Amalgamation of Equipment Production for Atomic Electric Power Plants. It became the basis for developing long-term production programs at a number of large Czechoslovak machine-building, metallurgical and electrical-engineering enterprises. A new industry is arising in our economy's structure--nuclear-power-industry machine building. In the CSSR, the production capacities have been created, and the industrial production of selected components of the primary and secondary loops [kontura] for AES's with water-water [water moderated, water cooled] reactors has been mastered, at the Skoda-Plzen, (Vitkovice), and Sigma-Olomouc Enterprises, the Slovak Electric Power Machine-Building Plants in the city of (Tlmacha), etc. Along with the USSR, Czechoslovakia has become a large producer and supplier of basic equipment for the AES's being built in CEMA member countries.

This was reflected, as well, in the Agreement of CEMA Member Countries and the SFRY [Socialist Federal Republic of Yugoslavia] on Multilateral International Specialization and Cooperative Amalgamation in Production and Reciprocal Deliveries of Equipment for Atomic Electric Power Plants for the Period 1981-1990, signed by representatives of the governments of the NRB [People's Republic of Bulgaria], the VNR [Hungarian People's Republic], the GDR [German Democratic Republic], the PNR [Polish People's Republic], the SRR [Socialist Republic of Romania], the USSR, the CSSR, and the SFRY. This document specified the divisions of labor among the countries involved for supporting the planned construction of atomic electric power plants with the necessary equipment--an important condition for development of CEMA Member Countries' United Power Systems.

For the purpose of creating conditions for the planned development of the nuclear power industry in the CSSR in the 1980's, the Program of Cooperation Between the CSSR and the USSR in the Area of Developing the CSSR Nuclear Power Industry to the Year 1990 was adopted by the CSSR and USSR Governments. Cooperation within its framework is directed toward using the Soviet Union's technological aid in developing Czechoslovakian nuclear energy. Moreover this will take place not only in building nuclear power equipment and in the effective use of existing production capacities and in supplying the Czechoslovakian atomic power stations under construction with nuclear fuel. Our countries attach great significance to this joint program; deputy heads of the governments of the CSSR and USSR are following the course of its development. In accordance with the program, 12 VVER-440 nuclear power units are being constructed in the CSSR at the (Yaslovske Bogunice), (Dukovany), and (Mokhovtse) AES sites, and the construction of 4 VVER-1000 nuclear power units has begun at the (Temelin) AES site.

The work on long-term economic development, and preparation of the Five-Year National Economic Plan for 1986-1990, speak clearly of the fact that the nuclear power industry also will occupy a prominent position in the CSSR energy balance in the future.

Role of the Nuclear Power Industry

The nuclear power industry's share in meeting Czechoslovak demands for natural energy resources constitutes about 3 percent at present, and should increase to at least 15 percent before the year 2000. At the same time, it is necessary, in the 1990's, to create the preconditions for building nuclear power industry production capacities on a scale that will permit increasing nuclear energy's share in meeting Czechoslovak demands for primary energy resources to 28-30 percent by the year 2010. Nuclear electric power plants' share in electric energy production in the CSSR exceeds 13 percent at the present time, and it should reach 30 percent in 1990, and over 50 percent in 2000. Moreover, the rapid growth in electric energy generation at nuclear electric power plants is intended not only to cover increases in electric energy production, but also to replace a large part of existing electric energy production at thermal electric power plants [TES's] being phased out. Due to the development of nuclear electric power plants [AES's], fossil-fuel electric power plants' share should be reduced from 85 percent in 1980 to 35 percent in 2000. It should be noted that not a single coal-burning thermal electric power plant has been built in the CSSR during the current five-year period. All of this is showing up favorably in lessening the power industry's harmful effects on the environment.

At present, 3 VVER-440 units are in operation at the (Yaslovske Bogunice) AES, and 1 at the (Dukovany) AES, with the overall electrical capacity of 1,760 megawatts. Start up of the fourth unit at the (Yaslovske Bogunice) AES still is expected this year, while bringing the final, fourth unit into operation at the (Dukovany) AES is planned for 1987. At the (Mokhovtse) AES site, the plant is being constructed for the main production unit, in which reactors of 440 megawatt capacity will be installed. The first of these should be brought into operation in mid 1989, and the others at 9-month intervals. The average rate of bringing VVER-440 units into operation at these sites amounts to about 1.1 year per unit during 1979-1992.

After 1990, and the end of the 12 VVER-440 units' construction, it is planned to provide for increase in Czechoslovak AES capacicities by constructing power units with VVER-1000. Start up of the first such unit, at the (Temelin) AES, is envisaged at the end of 1991, and one of the next three units each year and a half thereafter. Work is proceeding on selecting the construction site for yet another AES with VVER-1000.

Thus, by 2000, it is planned to have in the Czechoslovak energy system 12 units with VVER-440 and 5 units with VVER-1000, for an overall capacity of 10,280 megawatts. This will permit the Czechoslovak nuclear power industry to produce over 56 billion kilowatt-hours of electricity per year, and provide for the extraction of about 6,000 thermal megawatts of heat from the AES's.

Atomic Heat Supply

Development of the nuclear power industry also will affect the structure of the Czechoslovak heat supply, which will be using extracted AES heat. The means of building atomic heat supply plants--AST's--are under consideration (One 500 megawatt unit--even before 2000). According to plans, the nuclear power industry should be meeting about 0.3 percent of the country's requirements for heat in 1990, and at least 3-4 percent in 2000. All nuclear power units built in the CSSR will be equipped with turbine assemblies for extracting heat, which is to be delivered by heat mains to nearby industrial and urban complexes in the form of hot water.

The first Czechoslovak heat line of this type already is being constructed, from the (Yaslovske Bogunice) AES to the city of Trnava. It consists of 2 pipelines of 700 millimeter diameter, its length is 23 kilometers, and its heat capacity is 250 megawatts. Its construction is planned to be completed in 1986. Later on, a heat line will extend to the cities of (Glogovtsa) and (Pyeshtyani). Plans have been developed for supplying heat to the city of Brno from the (Dukovany) AES. Heat from the (Mokhovtse) AES will be supplied to the cities of Levice, Nitra, and (Tlmache). It is planned to supply the city of Ceske Budejovice area with heat from our first power plant with VVER-1000 units at the (Temelin) AES. Units of 1,000 megawatt capacity will be equipped with 1,000 megawatt turbines, providing for the extraction of 900 megawatts of heat with 3-stage heating of hot water to 150 degrees Celsius. Selection of construction sites for VVER-1000 power units in Eastern Slovakia, Eastern Czechia [Bohemia], and Northern Moravia will be carried out taking heat-supply prospects into consideration.

The experience of the Soviet Union in constructing AST's [nuclear heat supply plants] for supplying hot water to the cities of Gorkiy and Voronezh is being widely used in the construction.

Production Base

Implementation of the Czechoslovak nuclear program presents new demands upon the domestic production base of atomic machine building and the metallurgical, machine-building and electrical-engineering industries. Today we may note with satisfaction that our industry, thanks to the many years of Czechoslovak-Soviet cooperation, can provide 80 percent of all deliveries of primary and secondary loop [kontur] equipment for VVER-440 power units. The main attention now is being devoted to preparing for the production of equipment for VVER-1000 units, which must become the base for the nuclear power industry in CEMA member countries after 1990. Thus, the Skoda-Plzen concern is preparing for production of the VVER-1000, the turbine, and the separator-preheater for the turbine; the (Vitkovice) concern--the steam generator and volume compensator; the Sigma-Olomouc concern--the feed and prefeed pumps for the turbine, the high-speed gate valves, and the pipes; the (ChKD Dukla)-Prague Enterprise--the deaerator and feed tanks, and the condensate equipment; and the Czechoslovak Fan Plants--the filtration equipment, the air heat exchangers, and the fans.

In later years, Czechoslovak nuclear machine building's share in the deliveries of reactor units for CEMA member countries will constitute approximately 25 percent. At present, five type V-213Ch VVER-440's, manufactured by the Skoda-Plzen concern, already are in operation: two reactors at an AES [or at AES's] in the VNR, and three in the CSSR. Czechoslovak reactors are being installed in the VNR and GDR. Production of the equipment for 14 complete reactor assemblies for the CSSR, VNR, GDR and PNR has been set in motion at this concern.

It attests to the importance we attach to nuclear power industry matters that the first, and the most extensive, program developed for the Eighth Five-Year Plan (1986-1990) is the State ad hoc program "Development of the Nuclear Power Industry to the Year 2000."

Together With Our Soviet Partners

The contribution of the agreement on the Soviet Union's offer of assistance to Czechoslovakia in developing and investigating the physics of the atomic nucleus, and in using nuclear energy for national economic purposes, was stressed at the beginning of the article. That agreement, and also the subsequent agreements and treaties concluded at various levels in the course of the past 30 years, have furthered formation of the Czechoslovak scientific-research, experimental-design and production base, its structure and scope permitting it to be included effectively in the CEMA member countries' joint nuclear program. Thousands of scientists and specialists, and dozens of scientific-research organizations participate in this work.

The cooperation with our Soviet partners is developing in close connection with CEMA member countries' multilateral cooperation in the reactor science and technology field being organized by the CEMA Permanent Commissions for Cooperation in the Area of Using Atomic Energy for Peaceful Purposes and in the Area of Electric Power. The CSSR actively participates in the work of these commissions, and also attaches great significance to integrating activity of the international economic associations [MKhO's] Interatomenergo [International Economic Association for Cooperation in the Production of Nuclear Power Plants] and Interatominstrument [International Economic Association for Cooperation in Nuclear Instrument Making].

Within the framework of the Long-Term Ad Hoc Program for Cooperation in Energy, Fuel and Raw Materials, two agreements were concluded in 1980, at the level of the CSSR State Commission for Scientific and Technical and Investment Development and CSSR Federal Ministry of Fuel and the Power Industry on the one hand, and the USSR State Committee for Utilization of Atomic Energy (GKAE) and USSR Ministry of Power and Electrification on the other, for cooperation in mastering power units with VVER-1000, and developing large-capacity fast-neutron reactors.

Valuable results have been obtained over the past 5 years of their practical implementation, and a number of jobs has been let out on a contractual basis. In 1983, a procedure was adopted, by which proposals for the specialization and cooperative amalgamation of production of the AES components being jointly developed under the aforenamed agreements are presented by the CEMA Permanent Commissions for Cooperation in the Area of Using Atomic Energy for Peaceful Purposes and the Area of Electric Power to the Intergovernmental Commission for Coordinating the Cooperation of CEMA Member Countries and the SFRYu in Producing Equipment for AES's.

Significance of NTP [Scientific and Technical Progress] and NTS [Scientific and Technical Cooperation]

The Czechoslovak side is confident that the Comprehensive Program of CEMA Member Countries' Scientific and Technical Progress for 15-20 Years, being developed in implementation of the Moscow Higher Level Economic Conference's decision, will become a new qualitative leap forward in the brother countries' multilateral cooperation. As is well known, one of its five priority directions is accelerated development of the atomic power industry. The program should effectively further the consistent and purposeful union of scientific and technical cooperation with production and economic activity, encompassing the entire science-technology-production-application cycle.

The scientific and technical cooperation of Czechoslovak organizations in the nuclear power industry area is developing under the auspices of several departments--the Czechoslovak Commission for the Atomic Power Industry (ChSKAE), the Federal Ministry of Metallurgy and Heavy Machine Building, the Federal Ministry of Fuel and the Power Industry, and others. Thus the cooperation of the ChSKAE and the USSR GKAE encompasses, first of all, the following basic areas:

Water-moderated, water-cooled reactors--investigation of transient thermohydraulic processes and physical characteristics of the reactors and the materials of the reactor vessels;

fast reactors--thermophysical investigation of the core, complex calculations for power reactors, and development of fittings and steam generators;

radioactive waste materials--processing AES waste materials by hardening, and processing hard waste materials by incineration.

In direct scientific and technical cooperation between the CSSR Federal Ministry of Fuel and the Power Industry and the USSR Ministry of Power and Electrification, there are solved, for example, problems of mastering and operating AES's with VVER's; specifically, ensuring the equipment's quality of installation and operation, increasing effectiveness of the monitoring and control system, improving technical and economic indicators, studying plant manipulation characteristics, using automated control systems, and developing standard start-up programs.

The scientific and technical cooperation between the CSSR Federal Ministry of Metallurgy and Heavy Machine Building and the USSR Ministry of Power Machine Building is aimed at solving direct production problems, such as developing future directions in investigating reactor materials, automated anticorrosion-layer plating on inner surfaces of the VVER-1000 vessel's pipe couplings, improved technology for producing VVER-1000 vessel covers without using submerged-arc welded joints, methods for evaluating and checking materials and designs, technology for producing the rolled and welded drums for steam-generator shells, modernizing production of large steel castings for power industry machine building, etc.

The Soviet Union is the main designer and general planner for all atomic electric power plants built with its technical assistance in CEMA member countries. Therefore, scientific-research and experimental-design work in the CSSR is done in close liaison with the Soviet lead organizations.

Prospective Areas of Cooperation

In concluding, we should like to mention those areas, where, in our view, it is advisable to extend Czechoslovak-Soviet cooperation even farther. First of all, this means completing the development and mastering the production of equipment for AES's with VVER-1000.

At the same time, the technical and economic parameters of AES's with the VVER-440 should be further improved; first of all, by increasing the fuel's burning depth with a more uniform neutron flux in the core.

Great importance is attached to increasing the safety and reliability of components in AES primary and secondary loops [kontura]. This is a matter of reducing the neutron flux in the reactor vessel's walls, means for restoring the vessel after its embrittlement, and increasing the corrosion resistance of certain steam-generator parts. It is important, also, to improve the measurement and control systems on the basis of microprocessor technology.

The cooperation should be broadened, in our view, in such areas as methods improvement and equipment development for production and operational monitoring of the materials in components functioning under conditions of radiation, high pressure and temperature; solving the problems of radioactive waste materials arising in AES operation, and the means for compact storage of spent fuel in AES storage spaces; technology of fast reactors, and development of selected components for fast reactors having liquid-metal cooling.

The task of preparing technical and economic supporting documentation for heat production from nuclear sources for centralized public heat distribution, and resolving, in connection with this, the question of Czechoslovak industry's participation in the production of equipment for AST's, also is extremely urgent.

In the area of standardization and normalization, it is necessary to continue the work on MKhO Interatomenergo's program aimed at establishing uniform technical standards and requirements for the production and operation of power industry equipment, fittings, instruments, and materials for AES's, which are subjects of the agreement on specialization. It also is important to develop further the program of work on creating normative and technical documentation for planning, constructing, fitting out, and operating AES's.

We should expand and broaden cooperation, also, in developing standardized designs for VVER-1000 power units, and introduce computer technology into the process of preparing for and constructing AES's.

Czechoslovak-Soviet cooperation in the nuclear power industry is a shining example of successfully developing mutual relations based upon the principles of further broadening and improving socialist economic integration, an example reflecting the reasonable aspiration of the CSSR and USSR, and all the brother countries, to bring about a condition in which nuclear power will be used throughout the world exclusively for peaceful purposes.

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12319
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CUBAN, OTHER CEMA SPECIALISTS RECEIVE AES TRAINING AT USSR SITE

Moscow IZVESTIYA in Russian 20 Jun 85 p 1

[Article by A. Blokhnin, IZVESTIYA special correspondent, Energodar, Zaporozhye Oblast: "How They Teach AES Construction"]

> [Text] A group of Cuban specialists has arrived at the instructional center for training personnel in the construction of atomic power stations. This center has been created in Energodar under the construction administration of the Zaporozhskiy AES [atomic power station]. After receiving on-the-job training at the instructional center and directly at the ZAES facilities, they will work on building an atomic power station in their own country, where a large AES is being built at the site in Huragua with the technical assistance of the USSR.

I. Khalyavka, an expert in production training, conducts a short instructional session, and I occupy the work station of the tower crane operator. Under my left foot is the contact pedal. On the sides of the chair are two levers. Forward-reverse... The boom raises and lowers smoothly and the cargo hook slides up and down easily. And now the crane itself, stretched out before the trainer chair in all its three-meter height, moves along the rails.

Alongside we see the flashes of the electric welding and hear the characteristic din of the welding transformers. But the "electrodes" are not reduced in size no matter how hard the trainees try. This too is a simulation.

This is merely an example of the rich arsenal of the technical means of instruction which the Energodar center has at its disposal. There is a programmed instructional machine developed by specialists at the Kiev Engineering-Construction Institute--KISI. (The trainees prefer to call it simply "kisa"). There is a graph projector, a video recorder, and various electrified mnemoschemes...The theoretical instruction in the classrooms is intertwined with practical work in the shops. The course concludes with a mandatory in-service training period directly at the facilities of the AES under construction.

"Soon after work began at the construction site of the Zaporozhskiy Atomic Power Station," says Deputy Director of Construction Administration A. Reutov, it became apparent that we cannot do without the well-organized specialized training of workers. And so this center was developed. Our hopes have been fully justified. The graduates of the instructional center work with assurance and stability. The personnelturnover is less than 3 percent..."

"Before I worked in a vocational-technical school," says instructor A. Polivanaya. "At first here at the instructional center I could not get used to the fact that the training time is extremely short--only 6 months. Yet in this time the trainee receives not only a superficial knowledge, but goes off to the construction site with the certification of a qualified specialist--of the third, fourth, and sometimes even fifth grade."

"The active combination of technical means with a system of so-called 'problems training'," continues instructional center Director K. Chaykina," helps us to achieve this effect. We try to teach the future specialist to think logically and to achieve an in-depth mastery of the profession."

The present instructional center in Energodar is a modern complex equipped with 18 classrooms, a library with reading hall, and production training shops with an area of 1,200 square meters. A dormitory has been built for trainees coming to Energodar from other cities. It has an excellent sports gymnasium. The instructional center in Energodar has been awarded the certificate of the AUCCTU and Goskomtrud [State Committee for Labor and Social Problems] for its exemplary organization of training personnel for atomic power stations under construction. It has been recognized as the best professional training institution in the USSR Ministry of Energetics and Electrification.

It is therefore no accident that Energodar has been selected as the site for training foreign specialists. The Cubans were the first to come to the shores of the Kakhov Sea. Speaking with the group of center students who had just come from the Island of Freedom, I asked them their opinion of the professional training they received in the USSR.

"Before beginning our studies," says the group director and engineer Jorje Landaburo, "we had an extensive tour of all the construction facilities of the Zaporozhskiy Atomic Power Station. The scope of construction and the bold engineering decisions are impressive. There is no company in the world which is brave enough to undertake construction of such large atomic power units--one million kilowatts!--using the conveyer method. We would like to borrow this experience and try to apply it in our country..."

Power engineering specialists from Bulgaria, Czechoslovakia and Mongolia come to Energodar to study.

The flow-line construction of the Zaporozhskiy atomic giant is a general test of the capacities before the introduction of this form of high-speed construction at other similar facilities. And although the construction of the foundations for the fifth "million kilowatt unit" has only now begun at the ZAES site, the construction managers are already thinking of a new flow-line at the Chigirinskiy AES, which will be built in the neighboring, Cherkasskaya Oblast. As before, the instructional center ties its plans in closely with the prospective needs of construction.

12322
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ITALY

CRAXI URGES CREATION OF EUROPEAN NUCLEAR FORCE

AU262009 Rome ANSA in English 1930 GMT 26 Dec 85

[Text] (ANSA) Rome, December 26 -- In view of Spain's entry January first into the European Economic Community as a full-fledged member, Italian Premier Bettino Craxi gave a wide-ranging interview to Spanish television, touching on such areas as efforts to achieve greater internal balance within the EEC, closing the gap between the economies of the various members and the harmonization of regulations and institutions on the old continent.

In the interview, which will be beamed on Spanish television screens this evening, Craxi said that we live in an age when everything moves faster than before and that, therefore, many obstacles can now be overcome faster than before. "Therefore", he said, "on the whole I can say I am optimistic".

He said that conditions within the Community not only differed from country to country, but above all, from region to region. Thus, one of the historic goals of the Community has been to create a greater harmonization within. Moreover, Europeans must take a larger view and not concern themselves with Europe alone, he cautioned. He said that from a political point of view, the tendency had been for each European nation to play its own role on the international stage. However, this did not mean that Europeans as an entity did not exist, he said. They exist and they are the sum total of European nations that manage, sometime, to play a certain role, Craxi lent on.

As to security in a nuclear age, the Italian premier said that the problem had been solved for the time being through the alliance among the Western nations. However, he urged Europe to begin an entirely new path bent of creating its own nuclear force. He urged a concentration of efforts and cooperation in the fields of science and technology. He said that the technological gap between Europe, Japan and the United States must not be allowed to grow larger.

Craxi stressed that the Atlantic alliance was and must remain on an equal-footing basis with all nations working together for world peace.

The European Community, which as of January first will become a Community of twelve with the entry of Spain and Portugal, must move forward together in the year 1986 and he voiced confidence that Spaniards would be well in tune with those working for such progress.

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END

JPRS-TND-86-004

7 February 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

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AUSTRALIA

FRG URANIUM MINER ABANDONS LOCAL EXPLORATION

Sydney THE AUSTRALIAN 26 Dec 86 p 11

[Article by Ian Howarth]

[Text]

URANGESELLSCHAFT Australia Pty Ltd (UG), the local arm of the uranium exploration company established by the West German Government, will quit exploration in Australia.

The decision follows action by the Federal Government in February when it accused UG of trying to subvert Australia's uranium export policies.

The Government accused UG of selling a 100-tonne shipment of uranium to a French trading company to extricate itself from a contract with the operators of the Ranger uranium mine in the Northern Territory.

The company strongly denied the accusation.

This week, UG's sole remaining Australian representative, Mr John Barr, said the decision to quit Australia was a direct result of commercial and political factors.

UG is the holder of a 4 per cent equity in the Ranger mine, operated by Energy Resources of Australia Ltd (ERA); a 10 per cent stake in the Yeelirrie uranium project in Western Australia and a 40 per cent stake in the Westmoreland uranium deposit in Queensland.

Mr Barr said the decision to quit Australia was disappointing.

He described the Federal Government's action as "commercially unprecedented".

Mr Barr said UG was engaged in negotiations to sell most of its Australian interests, which included substantial equity interests in a wide range of exploration leases.

The company was at one time Australia's major uranium exploration group.

It once employed 24 field geologists, but in the past 12 months its exploration efforts have been considerably scaled down in the face of a declining world market for uranium, and intense political opposition.

Reputation

UG will retain its Ranger, Yeelirrie and Westmoreland interests.

Mr Barr said the company had reduced its international uranium exploration efforts in the past year in the face of the shrinking world demand.

It is particularly active in the United States, Canada and South America.

Mr Barr was reluctant to comment on whether Australia's reputation as an international trading partner had been substantially harmed by the Federal Government's actions.

The company said in an advertisement in *The Australian* announcing its decision: "UG Australia Pty Ltd will cease exploration in Australia and close its office at 608 St Kilda Rd, Melbourne on December 20, 1985."

It was signed by Dr W.E. Schindlmayr, managing director, technical.

The political drama which prompted UG to leave Australia was sparked by the Federal Minister for Trade, Mr Dawkins.

Mr Dawkins issued a statement which said he believed UG had contrived a situation which it hoped would permit it to break a contract with ERA.

The contract specified UG would accept 400 short tonnes of uranium yellowcake a year from the Ranger mine.

Mr Dawkins accused UG of trying to sell 100 tonnes of yellowcake to a French trading company in a bid to have the sale stopped by the Australian Government.

He said this stoppage would then allow UG to withdraw entirely from its contract.

However, UG denied the charge strenuously and said that even if the Government stopped the sale, it would not be able to cancel the contract.

The matter went as high as embassy level in Australia and West Germany and caused a diplomatic furore.

Mr Dawkins accused UG of trying to pull out of its contract on commercial grounds. He said the Australian floor price for uranium, which is the minimum price paid by UG for ERA yellowcake, was higher than the prevailing international spot price at the time.

Ultimately, Mr Dawkins declined to ban the sale of the disputed 100-tonne shipment of yellowcake. He said he was convinced the U308 was not destined for use in France despite it being sold to the French trading company, Enership SA.

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CSO: 5100/4304

NUCLEAR EXPERT CRITICIZES GOVERNMENT URANIUM RESTRICTIONS

Sydney THE AUSTRALIAN 31 Dec 85 p 10

[Text] FEDERAL Government restrictions on the development and export of uranium deposits are locking Australia out of a growing world market, according to an expert on nuclear energy.

Dr Leslie Kemeny says that unless something is done soon, Australia may miss the uranium boat. He says international demand for uranium is accelerating, offering Australian producers enormous challenges and opportunities.

Yet, despite having the world's largest known reserves, and low-cost producers, Australia is giving away the major advantage it holds.

Dr Kemeny, a senior lecturer in nuclear engineering at the University of New South Wales, made his comments in an article published in the latest issue of the Mining Review of the Australian Mining Industry Council.

He says that at the beginning of next year, Australia stands at the cross-roads for full-scale development of its uranium mining industry.

He gives three main reasons for this increase in demand.

About 60 nuclear power stations in the United States will be completed and awaiting licensing in the next two to three years; many developed countries are increasing their nuclear generating capacities by about 15-20 per cent a year; many Third World countries are increasing their capacities.

"No nation sitting on top of what could now prove to be 30 to 40 per cent of the world's prime fuel resources has the moral right to either withhold supply or to renege on existing contracts," Dr Kemeny says.

Australia has only two producing uranium mines: Ranger and Nabarlek in the Northern Territory, with the Roxby Downs mine having recently been given the go-ahead.

Dr Kemeny says Canada is set to increase its share of the world market from 22 per cent to 31 per cent in the next five years.

"There is no doubt that Australia could supply larger quantities to the world market if production was possible and domestic commercial policies became pragmatic."

He says Australia is transferring its 'comparative' advantage, as a low-cost producer with huge reserves, overseas.

"As the competing countries increase their investments in uranium mining, so they lock themselves into maintaining market share in the face of new entrants," he says.

"In simple terms, once you miss the boat the energy required to catch it becomes a disincentive to even trying."

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CSO: 5100/4304

HONG KONG

GROUP TO CAMPAIGN FOR HONG KONG NUCLEAR-FREE ZONE

Hong Kong SOUTH CHINA SUNDAY MORNING POST in English 1 Dec 85 p 5

[Article by Vicky Wong]

[Text]

Hongkong should be declared a nuclear-free zone, given recent developments in China and other Asian and Pacific countries.

This is the view of the environmental pressure group Friends of the Earth which is launching a nuclear-free campaign on Thursday.

FOE secretary Ms Linda Siddall said the campaign will kick off at a FOE-sponsored public meeting at which New Zealand Commissioner Frank Muller has been invited to give a talk called "South Pacific nuclear-free zone — a small step to nuclear disarmament."

The meeting is scheduled for 6.30 pm at the St John's Cathedral new hall, where Mr Muller will also be willing to answer questions on the Rainbow Warrior affair.

FOE established a Nuclear-Free Pacific Group in May to work exclusively on peace issues, Ms Siddall said.

The group is affiliated to World Disarmament and has also applied for formal affiliation with Greenpeace.

"There have been a number of developments in the past year or so which indicate that it is not necessarily unrealistic to think that Hongkong should and could become a nuclear-free zone," said Ms Siddall, also NFPG's secretary.

These include:

- A meeting of the six-member Association of Southeast Asian Nations in January to re-activate discussions for a nuclear weapons-free zone for Southeast Asia.
- The indefinite postponement of the first visit to communist China by three US warships, originally scheduled to make port at Shanghai in May. The visit was scrapped when party General Secretary Hu Yaobang said in April China would not accept port calls from ships carrying nuclear weapons.
- A May *Peking Review* article on disarmament, which stated that China had always supported countries which made their territories nuclear-free zones and that all nuclear countries, particularly the superpowers, should respect the status of these zones.
- The formation of a new peace organisation in China in June to promote contacts with anti-nuclear activists abroad.

The Chinese People's Association for Peace and Disarmament has as its president Mr Zhou Peiyuan, a vice-chairman of the Chinese People's Political Consultative Conference, an advisory body to the National People's Congress.

Its eight vice-presidents include three officials of the Communist Party.

- The first international peace conference in China in June, which brought together representatives from 25 countries.

Delegates were told the "most urgent task that must be undertaken to safeguard world peace" is to stop the arms race by the two superpowers and that China needed a peaceful environment in which to concentrate on modernising the country.

- The August signing of the Treaty of Rarotonga for a South Pacific nuclear-free zone by eight Pacific island nations, including Australia and New Zealand.

The treaty area stretches from the Equator to the Antarctic, and from Australia to South America.

Five other South Pacific nations are expected to sign the treaty following constitutional formalities, although one — Vanuatu — has declared it will not do so for at least a year.

"On the face of it, New Zealand's efforts in the South Pacific seem a little remote from Hongkong," said Ms Siddall.

"But if people look at the map, they begin to appreciate how nuclear the Pacific is and how much a part of the Pacific Hongkong is.

"It seems to us at FOE that given China's stated support for the establishment of nuclear-free zones, this is an ideal time for Hongkong to move towards becoming a nuclear-free zone itself.

"If China will respect Hongkong's autonomy to the extent of not using the harbour for her nuclear-capable ships and will also keep out American nuclear-capable ships, then the nuclear-free Pacific zone can extend to and include Hongkong."

According to Ms Siddall, declaring a place a nuclear-free zone can provide a concept and a statement of intent that people can work towards realising.

She pointed out that as of December last year, 207 nuclear-free zones had been declared in Japan.

In the US, numerous schools and churches have declared themselves nuclear-free, as have many city councils in the United Kingdom.

"It's a symbolic way for people to make their views known," Ms Siddall said.

"It's not necessary that there are actually no nuclear weapons or nuclear powered reactors in those zones.

"It's a way for people to make a statement that they're against nuclear weapons and nuclear power."

Ms Siddall said about 100 US naval ships visit Hongkong yearly and about half of these carry nuclear-weapon systems.

And the recent deploying by the US of submarines armed with Tomahawk missiles in the Pacific has made the area "even more nuclear."

"These are identical to the land based cruise missiles deployed in Europe last year and they are being deployed with almost no protest at all in the Pacific," Ms Siddall said.

There are plans to deploy a total of 250 of these in the Pacific eventually, compared to 464 cruise missiles in Europe, according to Ms Siddall.

This will come on top of about 350 US military bases in and around the Pacific and 10 Soviet bases in Vietnam.

In South Korea, there is a major concentration of US ground and air forces, along with 600 to 700 nuclear weapons.

There are 119 US bases in Japan with more than half based in Okinawa, while the Philippines is home to the naval base of Subic Bay and the largest US base in Asia at Clark.

"The majority of the population here is not conscious of these issues," said Ms Siddall.

"People here don't have control over foreign policy and have on the whole a refugee mentality.

"But there are indications this is beginning to change."

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CSO: 5150/0043

HONG KONG

HONG KONG GROUP BACKS PRC ANTINUCLEAR DEMONSTRATIONS

Hong Kong SOUTH CHINA MORNING POST in English 28 Dec 85 p 8

[Text] The recent anti-nuclear test demonstrations by Chinese students could signify that the Chinese Government is willing to allow more freedom of expression.

Local environmental groups have pledged their support to the students for their attempts to make their views known.

The secretary for the Friends of the Earth, Miss Linda Siddall, said it was a "heartening" indication that the Government in China was more relaxed and more open to democratic expression of people's feelings.

Her environmental pressure group is totally opposed to nuclear testing which they think is unnecessary and would contribute to the arms race.

They also think it is environmentally damaging, even when explosions are underground, Miss Siddall said.

"We fully support the mainland students to persuade their Government to cease such tests," she added.

Echoing her view was the chairman of the Hongkong Conservancy Association, Mr Wan Shek-lun.

He said the nuclear issue has generated much concern all over the world and this has also been the case in communist countries.

And although demonstrations are rare in China, they are one way for people to express their opinions on the issue, he added.

Mr Wan also felt that there was a trend that the Chinese Government was more open to democratic expressions of people's feelings.

Last Sunday, ethnic minority students from China's Xinjiang region staged a demonstration in Beijing's Tiananmen Square to protest against nuclear weapon tests in their region.

Although a Chinese Govenment spokesman said in August that China has conducted few nuclear weapons tests, reports say foreign seismic readings indicate that an estimated 25-plus have taken place at Lop Nur.

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CSO: 5150/0048

HONG KONG

DAYA BAY PROJECT 'WORRIES' ENVIRONMENTALISTS

Hong Kong SOUTH CHINA MORNING POST in English 4 Jan 86 p 6

[Article by Jimmy Leung: "Safety Fears on Daya Bay"]

[Text] An environmental protest group yesterday expressed concern over the price implications of the equipment for the proposed Daya Bay nuclear power plant in Shenzhen.

The secretary of the Friends of the Earth, Ms Linda Siddall, was commenting on the signing of the memorandum of understanding between China and Britain's GEC group on the purchase of turbine generators for the plant at a price of £250 million (about HK$2.78 billion).

"We have absolutely no reason to welcome such a project," Ms Siddall said.

She was "extremely worried" over its safety aspects based on the reported discount offered to China by GEC and the French firm Framatome, which will supply two pressurised nuclear reactors at the cost of about US$700 million (about HK$5.5 billion).

The deal between China and Framatome was struck late last month with an agreement signed between the French firm and the Guangdong Nuclear Power Joint Venture Company in Beijing.

Framatome's sister company, Electricite de France (EdF), also signed a memorandum of understanding with China on the overall engineering design of the $27 billion project.

Ms Siddall said it appeared there was a "drastic" price reduction from the British and French suppliers of equipment to the plant which will supply 70 per cent of the electricity to Hongkong in 1992.

In October, she said, it was reported that China wanted a discount of up to 25 per cent off the original price of the British and French equipment.

It was reported then that GEC had been earmarked to provide turbines and other equipment worth an estimated £500 million (about HK$5 billion). Framatome had been assigned the provision of two pressurised-water reactors, worth a reported US$1.4 billion (about HK$10.9 billion), for the 1,800 megawatt plant.

"Price and quality are always closely linked and we are very concerned," she told the SCM Post.

On the commission date, Ms Siddall said the plant had already been delayed for four years.

Furthermore, Ms Siddall, a lawyer, said no nuclear plant in the world "has been completed in 6½ years," and "the implication is terrifying."

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CSO: 5150/0047

JAPAN

SCIENCE AGENCY REPORTS LAG IN NUCLEAR POWER

OW060419 Tokyo KYODO in English 0341 GMT 6 Dec 85

[Text] Tokyo, 6 Dec (KYODO)--The Science and Technology Agency said Friday that Japan is still lagging far behind other nations in technological developments in the field of uranium enriching and fast breeder reactors. In its white paper on scientific development, the agency also said Japan needs to spend more on basic studies and research in various scientific fields. The Japanese Government shares only 50 percent of the total investment in the field of basic scientific studies while the U.S. Government's burden reaches some 70 percent, it said.

The paper urged the Japanese Government to be more active in spending for scientific development, further pointing out that the West German Government takes care of some 80 percent of total investments in basic studies, the French Government 90 percent and the British Government 80 percent. The average annual spending by Japanese private firms on basic studies and research is only 258 million yen, and even big firms spend an average of only 10 billion yen for the purpose, it said.

In order to help develop creative and revolutionary scientific technology, the government needs to introduce some big development projects that could serve as an "engine" for the private sector, the paper said. It suggested that such projects be introduced in the field of space development, citing the achievements of the U.S. Apollo project, which has led to the emergence of vast amounts of new know-how and by-products. Japan's spending in the space development field is still behind that of the United States, France and West Germany, it said.

Japan has achieved a high standard in the development of new facsimile and video machines and industrial robots even though it needs to make improvements in such fields as uranium enriching, it said.

As many as 95 percent of Japanese firms have shown their willingness to develop new technologies in a way or another and total spending on studies has shown a constant growth rate of about 10 percent in the past 6 years, much higher than the 4-5 percent growth rate in gross national product, it said. Such spending has been emphasized in the motor, communications and electronics fields, it said.

The paper urged a joint effort by the government, schools and private industries for further development of science technologies, saying universities and government research institutions should take such the initiative.

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CSO: 5160/030

GLOBAL NETWORK TO DETECT NUCLEAR TESTS PLANNED

OW071145 Tokyo KYODO in English 1107 GMT 7 Dec 85

[Text] Tokyo, 7 Dec (KYODO)--The Foreign Ministry will promote the establishment of a worldwide earthquake monitoring network to detect small-scale underground nuclear tests next year. To begin with, officials said, the ministry will seek a budgetary allocation of 35 million yen in fiscal 1986 to set up a system linking eight nations. The initial project envisages the establishment of a seismic observation network in the eight nations to exchange information concerning underground detonations of nuclear devices. The eight countries will be Japan, the United States, Britain, West Germany, Australia, Canada, Sweden and Norway.

The ministry will ask private firms to develop the computer software necessary to detect small-scale nuclear blasts with a force ranging from 20 kilotons to 50 kilotons. The ministry hopes to complete a model plan for an integrated detection network by 1987 for presentation to a disarmament conference in Geneva.

Ministry officials said the proposed network will eventually link 50 earthquake observatories around the world, including the Soviet Union and African nations. A U.S.-Soviet test ban treaty signed in 1974 prohibits underground detonations of nuclear devices with a force of more than 150 kilotons because it is almost impossible to detect tests of smaller scale. The ministry wants to use Japan's advanced earthquake detection technology to help attain the ultimate goal of a total ban on nuclear weapons.

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CSO: 5160/031

COMMISSION URGES FURTHER STUDY OF NUCLEAR SAFETY

OW130153 Tokyo KYODO in English 0049 GMT 13 Dec 85

[Text] Tokyo, 13 Dec (KYODO)--The Nuclear Safety Commission, in a report released Friday, called for expanded study and research on safety of nuclear power stations and transportation of radioactive materials. The annual report by the governmental commission said Japan followed safety guidelines and regulations worked out by other countries when it started nuclear energy development programs in the latter half of the 1950s. But Japan began setting independent safety guidelines in the late 1970s and it has become one of the most advanced nuclear power development countries of the world in the 1980s, the 435-page report said.

Japan now has three basic and nine supplementary guidelines concerning location of nuclear power stations, their design and safety, according to the report, the fourth in a series. The report said commission specialists have been reexamining the three basic guidelines after the accidental radiation leak at the Three Mile Island nuclear power plant in the United States in 1979. There have been no serious accidents involving Japanese nuclear power plants, which supply about a quarter of Japan's total electricity consumption. Japan is banned by law from developing or using nuclear energy for military purposes.

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CSO: 5160/032

YOKOSUKA ANTINUCLEAR DEMONSTRATIONS ON DECLINE

OW140359 Tokyo KYODO in English 0314 GMT 14 Dec 85

[Text] Yokosuka, Kanagawa Pref, 14 Dec (KYODO)--The nuclear-powered U.S. submarine Pintado arrived here Saturday marking a record portcalls made by American N-powered submarines this year. The number of visits to the U.S. naval base at Yokosuka by U.S. nuclear-powered subs this year has far exceeded the previous record of 23 established last year, according to pacifist organizations. Despite the increase in the nuclear subs' portcalls they said, residents of the city have generally remained indifferent to the antinuclear movement. Police said there have not been many people taking part in rallies and demonstrations against visits by nuclear subs this year. Last year pacifist organizations said some 110,000 people participated in such gatherings. Unions have stopped holding outdoor meetings since July.

Among the 30 portcalls, 13 have been made by Los Angeles class subs capable of carrying Tomahawk nuclear cruise missiles, and seven by sturgeon class attack submarines.

A Yokosuka citizens' group opposed to nuclear subs says only about 50 people respond to each protest rally it organizes. A group leader said it is hard to keep citizens interested in the antinuclear movement because they cannot actually see any nuclear weapons to bring home their potential danger.

The U.S. Government maintains a policy of not revealing whether American military ships coming to Japan are armed with nuclear weapons.

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CSO: 5160/033

FUJIAN PROVINCE EXAMINES FEASIBILITY OF NUCLEAR PLANT

Hong Kong SOUTH CHINA MORNING POST in English 13 Dec 85 p 11

[Text] Fujian province has started a preliminary feasibility study into the construction of a nuclear power plant although it is clear there will be no money for such a project until the next decade.

Mr Zhang Ruiyao, deputy director of the Planning Commission of Fujian province, said: "We have formed a group of experts to look into the project but in view of the financial situation, it is believed we cannot go ahead with it in the Seventh Five-Year Plan which starts next year."

The probable site of the plant is in Quanzhou but it has not been finalised, another official said.

Mr Zhang said electricity shortages in the province average 10 per cent--refuting some press reports which put the figure as high as 30 to 40 per cent.

He said a main problem is an over-reliance on hydro-electric power in the past which has resulted in power shortage during dry winter seasons.

Currently up to two thirds of the power supply comes from hydro-electric plants. The rest comes from coal-fired plants and this is considered unsatisfactory, said Mr Zhang.

The power problem has become more and more acute following the opening of the province five years ago.

But now the province is determined to change its imbalance of power generation by building several coal-fired and oil-fired power plants.

But again there could be problems too.

A latest example is an oil-fired plant in Mawei which is near Fuzhou, the provincial capital.

It was built by French engineers to serve the developing Mawei Economic and Technological Development Zone.

French experts involved in the project said the Chinese wanted the plant to operate in a very short time and so a small-scale oil-fired station was erected.

But when the plant was completed, the provincial authorities found they were unable to buy fuel.

Nevertheless, the authorities are determined to boost electricity supplies to the province and are planning at least three other plants in addition to the Mawei project.

According to Mr Zhang, the power generation in Fujian last year was 6.75 billion kilowatts (units).

(Hongkong with a quarter of the population of Fujian used about 15.3 billion units in 1984).

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CSO: 5150/0045

AGREEMENT ON DAYA BAY PLANT REACHED WITH FRANCE, UK

Deal with Framatone

Hong Kong SOUTH CHINA MORNING NEWS in English 24 Dec 85 p 1

[Article by Daniel Chung: "Daya Bay Deal Struck with Paris"]

[Text] A deal has finally been reached between France's nationalised nuclear giant Framatome and China on the supply of key equipment for the Daya Bay nuclear power plant.

This follows an agreement by both sides on the price of two nuclear reactors at about US$700 million (about HK$5.5 billion).

A memorandum of understanding, which represents a major breakthrough in the protracted negotiations lasting for more than three years, was signed by the French firm and the Guangdong Nuclear Power Joint Venture Company in Beijing on Sunday.

The two sides are expected to sign a formal contract for construction of the plant by early March.

Sources close to the talks said the French delegation had also finalised the financial aspects of the project--one of the key topics in the negotiations--with Chinese officials in Beijing.

Framatome is providing 100 per cent of the financing for the installation of the two reactors. Interest rates would be based on Organisation of Economic Co-operation and Development levels, at 9.85 per cent.

One source said the date for the formal contract to take effect had tentatively been set for March 3.

Both sides are understood to have made major concessions on the price of the nuclear equipment.

But the source said the French firm was "absolutely satisfied" with the final pricing level for the reactors reached by both sides.

He said the original estimated price of the nuclear equipment at more than $10 billion was somewhat misleading as it included the interest on the loan.

Framatome's sister company, Electricite de France (EdF), which will be responsible for the project's overall engineering design, also signed a memorandum of understanding with China on Sunday.

At present, Britain's General Electric Co is in final talks with Chinese officials on the supply of conventional turbine generators for the plant. British officials are expecting an agreement before the end of the month.

The source said whether Framatome and EdF could sign the formal letter of intent in March would depend on the result of negotiations between China and GEC.

He said it was intended that all the three contracts be signed on the same date.

He said between now and March, Framatome would work out the details of the formal contract with Chinese officials.

The chairman of China Light and Power, Lord Kadoorie, said last night he had no new information on the deal but that he expected reports on the deal were correct.

An official spokesman for CLP, Mr Robert Ip, also said he had no information on the deal.

CLP and China co-own the Guangdong Nuclear Power Joint Venture Co which was set up to undertake the nuclear project.

CLP, which will buy 70 per cent of power from the plant, is aiming at commissioning the plant by late 1991 at the latest to meet Hongkong's 1992 summer peak demand for electricity.

The 1,800-megawatt plant at Daya Bay is expected to cost about $27 billion.

Accord with GEC

Hong Kong SOUTH CHINA MORNING POST in English 3 Jan 86 p 1

[Article by Albert Chan: "GEC Seals Daya Bay Deal with Beijing"]

[Text] A final accord was reached on New Year's Eve between Britain's GEC group and China for the supply of power generators for the country's first commercial nuclear plant in Daya Bay, Shenzhen.

Together with the Sino-French accord signed 12 days ago, the British contract, carrying a price tag of £250 million (about HK$2.78 billion), will put the plant in action in 1992--several months later than the original projected commissioning date.

According the Mr James Cronin, assistant managing director of GEC Turbine Generators,it has been agreed that the commissioning date for the plant's first 900-megawatt unit will be 1992 and the second unit the following year.

The commissioning date was earlier scheduled for the end of 1991, in time to meet Hongkong's summer peak in September 1992.

But one official of China Light and Power Co, which will depend on the plant for power supply in the 1990s, said yesterday there will not be any serious problem if the commissioning date is before September 1992.

He added, however, that this is based on present forecasts which put the annual growth in electricity demand in Hongkong for the next seven years at seven per cent.

GEC and China signed a memorandum of understanding for the supply of turbine generators on Tuesday after more than five years of hard bargaining that involved not only the British company but heads of both states.

Agreement on the nuclear part of the plant was struck on December 20 and 21 when China signed separate memoranda of understanding with Framatome, the French reactor manufacturer, and Electricite de France, the French firm responsible for overall engineering design.

The British and French accords marked a milestone in the project which has been hanging in the balance for the past few months with negotiations at a critical stage.

Chinese Vice-Premier Mr Li Peng met the British Ambassador, Sir Richard Evans, and the French Ambassador, Mr Charles Malo, on Wednesday to congratulate them on the deal.

Describing the memorandum of understanding as a good beginning for the project, Mr Li said he hopes all involved parties will heighten their co-operation to bring to reality what has been written in the documents.

"Its completion will serve the long prosperity and stability of Hongkong," Mr Li said.

Hongkong will purchase 70 per cent of the electricity generated by the Daya Bay plant with the rest going to Guangdong province.

Much time in the protracted negotiations over the last few years has been spent on technical specifications and ensuring compatibility between the British and French equipment, since this is the first time Framatome and GEC have been brought together on a nuclear plant of this magnitude.

Formal negotiations on the project's price and financing began in the middle of last year and sharp differences among the negotiators were apparent.

Talks resumed in October, but again the three sides failed to come to any conclusion.

Mr Robert Davidson, GEC's managing director who is currently in Beijing, told the SCM POST yesterday the tough negotiations continued through the Christmas holidays.

He said his company is "very pleased" with the deal which, according to sources close to the negotiations, is worth "more than" £250 million (about HK$2.78 billion) excluding interest.

The French equipment is worth about HK$5.5 billion, also exclusive of interest.

The next and final hurdle of the project will be the financing arrangements for the British equipment.

It has been learnt that a team of British bankers led by the Midland Bank will go to Beijing shortly to hold talks with the Bank of China on the matter.

The French bankers have already reached agreement with the Chinese on financing.

A senior Chinese official said detailed site plans for the plant, which will be prepared by the French and British companies, are expected to be available by April and excavation work can begin then.

The present thinking involves signing letters of intent with Framatome and GEC in early March and formal contracts a few months later.

But the exact date of contract signing is undecided.

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CSO: 5150/0046

CANADA

GOVERNMENT TO CUT RAW URANIUM EXPORTS IN HALF

Vancouver THE SUN in English 8 Nov 85 p A22

[Text] OTTAWA (CP) — Exports of raw uranium ore will be cut by more than half as Ottawa toughens its policy to provide more work at Canadian processing plants.

Canada is the world's largest uranium exporter. The processing industry, centred on government-owned Eldorado Nuclear, is a $50 million-a-year business employing about 500 workers. Eldorado operates the country's only uranium refinery at Blind River, Ont., and the only processing plant at Port Hope, Ont.

Mines Minister Bob Layton redefined the policy in a letter last month. Canadian government policy has long required that all exports must be processed in Canada as long as Eldorado can handle the job.

But in recent years, more than a quarter of uranium shipments to foreign customers involved raw ore, the documents show.

Between 1979 and 1983, the government granted 16 exemptions allowing the export of about 9,000 tonnes of raw ore.

Ottawa has tried for about a year to keep secret all information about the number of exemptions, arguing it was protecting trade secrets.The information was only released after the Canadian Press complained to the government's information commissioner. Officials had said last year that exemptions to the policy were rare.

Under the restated policy, the government estimates that shipments of unprocessed ore will fall to about 10 per cent of total export orders.

"I think we're reasonably happy with the policy," Ron Dakers, an Eldorado vice-president, said.

Believing that uranium exports would increase and that the policy would be honored, Eldorado began to expand its facilities, building its refining plant in 1983 and doubling the capacity of its processing plant.

The increasing number of exemptions was partly responsible for layoffs at both plants, Dakers said. He said Eldorado could have done some of work, but was not given the opportunity to even make a bid.

The policy was strained by the start of operations last year at the Key Lake mine in northern Saskatchewan, the world's largest and richest uranium ore body. The Key Lake consortium found it easier to compete in a tight world uranium market if it could avoid the Canadian requirements.

/12379
CSO: 5120/27

CANADA

LICENSE SOUGHT FOR COMMERCIAL NUCLEAR SUBMARINE

Ottawa THE CITIZEN in English 29 Nov 85 p A4

[Text] A Canadian and French consortium planning to give Canada the world's first nuclear-powered commercial submarine has made its first approach to the Atomic Energy Control Board for a reactor licence.

The board announced Thursday that International Submarine Transportation Systems has filed a notice of intention to submit a formal application for a licence early next year.

Because the ship is intended for operation in Canadian waters, it must get approval from the board to run its nuclear power plant.

The vessel, to be known as the *SAGA-N*, "will be the largest commercial submersible ever launched," Ed Dunn, president of Halifax-based International Submarine Transportation Systems, said in an interview.

The sub, whose hull is now being finished at a shipyard in Marseille, will be 38 metres long, will weigh about 780 tonnes and will carry a crew of 15.

The completed project will cost about $130 million. Although Dunn said the company might eventually ask for government help, it now is being financed without a drop of federal money.

The sub will be launched from Marseille next October with an unconventional type of non-nuclear engine and after sea trials will be brought to Canada in late 1987.

It will then be fitted with a nuclear power plant modelled on the small, Slowpoke research reactors used by several Canadian universities. Addition of the reactor and engineering changes to accommodate it will take about 60 weeks, Dunn said.

The reactor is being built by ECS Energy Conversion Systems of Ottawa, one of the partners in the consortium.

ECS vice-president Allan Kastner said ECS has never built a reactor before and admitted the challenge is daunting.

The reactor will produce about 1.5 megawatts of power, much more than is produced from the conventional Slowpoke. But compared to nuclear generating plants on land which produce hundreds of megawatts and to power plants used in military subs, the Saga reactor is a baby.

Dunn said the main purpose of the vessel, which can dive to about 600 metres and then deploy a team of six divers, will be to explore the seabed of Canada's continental shelf below the ice-pack.

/12379
CSO: 5120/27

ECOLOGICAL ASPECTS, RELATIVE SECURITY OF NUCLEAR ENERGY CITED

East Berlin TECHNISCHE GEMEINSCHAFT in German No 12, Dec 85 p 27

[Article by Dr Roland Maier, GDR Academy of Sciences, Institute for Sociology and Social Policy: "Ecological Aspects of Nuclear Energy--Environmental Planning"]

[Text] Calculations by Soviet scientists indicate that the world's consumption of energy will roughly double from 1980 to the year 2000. In some cases, other predictions are even considerably higher. The reasons for this are, above all, further progress in mechanization and automation processes, and also an increase in the world's population and buildups in the energy base in the developing countries.

Currently there are still considerable reserves of fossil sources of energy such as petroleum, coal, and natural gas for dealing with our present energy needs. But what is problematic is how the enormous increased demand for energy expected in the future can also be satisfied at an economically and ecologically acceptable cost. Today, the tempo in opening up new fossil energy reserves is no longer enough to assuage in the future the constantly swelling "energy hunger." Thus, for example, by the turn of the century only about 2 billion tons of new recoverable petroleum resources will be discovered annually--but current world consumption already amounts to 3.2 billion tons per year.

Gradual Substitution

At present, the generation of energy by means of nuclear fission is the only technology that can meet on an industrial scale a large percentage of the energy requirements that are expected.

The expansion of nuclear-energy production is taking place on a systematic and long-range basis in the GDR as well. Assuming our present output level and the acceptable economic conditions of today, our reserves of brown coal will last for about 100 years more. But in this connection the fact must be considered also that in the GDR, brown coal is the only available source of carbon in relatively large quantities and therefore it must be kept on hand also as a raw material for the chemical industry. Accordingly, if there is a further rise in the brown coal output to much beyond 300 million tons per year by 1990, the additional increase in energy requirements will have to be met primarily by way of nuclear energy.

At present, about 12 percent of the electric-power requirements of the GDR are being met by nuclear power. But by the turn of the century, 40 percent of our electric power should already be produced by nuclear facilities.

Energy production by means of nuclear power is also associated with questions about the possible dangers and ecological problems involved.

The Risk Is Acceptable

The cycle of the nuclear-power industry commences with the mining of uranium ore. If there is an improper storage of the large amounts of contaminated media resulting from the processing of the ore, there is a danger that radioactive substances may lead to a pollution of water bodies. But on the whole, such quantities of released radioactive material are very small. Here is a comparison in this regard: From the mineral fertilizers used in the FRG in 1977 the radioactivity dose released was about 2 to 3 times more than that released from the excavated material that had been produced from the recovery of the uranium consumed in the FRG in the same year.

In the operation of nuclear power plants (NPP's), radioactive substances are emitted into the atmosphere along with the vent air and into the drainage canals with the waste water. Based on many years of operating experience with about 200 NPP's throughout the world, it can be estimated that the overall additional radioactive strain on the environment resulting from this comes to only about 25 percent of the average natural radiation exposure.

In considering the interaction between nuclear energy and the environment, it is evident that the removal of the heat generated in cooling the reactors may become a problem. In the cooling system most commonly used at present--river-water cooling--the amounts of water needed are taken from a body of water and after being heated up by about + 10° K are fed back into this water body. With the use of this cooling method alone, future water requirements would rise enormously, and just for the FRG itself they would amount to about 10 times the water circulation of the Rhine in the year 2000. Therefore it is urgently necessary to focus on evaporative cooling and dry-air cooling.

Extensive Safety Features Offer Protection

As more than 20 years of operation have shown, nuclear power plants have a level of engineered safeguards that is unmatched except in the space-travel sector. Thus, safety systems are generally equipped with redundant backup systems. From risk studies it follows that non-nuclear disasters--that is, natural events such as earthquakes, tornadoes, and accidents such as airplane crashes, dam bursts, and so forth--have a considerably larger probability of occurrence than nuclear catastrophes. Probability calculations with 100 NPP's now in operation showed that non-nuclear damage occurs at a frequency up to 10,000 times greater than damage from nuclear causes.

Waste disposal from nuclear power plants--that is, above all the removal of highly radioactive waste from the fuel cycle and the isolating of these residues from the biocycle--is a serious problem. Deep storage in geologically stable formations is regarded as an acceptable solution for disposing of radioactive wastes. Salt deposits, granite rock, and strata of clay are generally suitable for this purpose. On the other hand, the practice engaged in by capitalistic states of submerging within the sea weakly and moderately active wastes in steel and concrete drums is extremely dangerous from an ecological standpoint.

So far, there is still no complete set of analytical tools for a comparative assessment of different energy-generation facilities. Starting with emission, in order to have the most comprehensive comparison possible of various energy conversion methods the resulting adverse effects and damage must be systematically analyzed. In this regard, with power plants running on coal and oil the emissions of sulfur dioxide and other pollutants must be considered in particular. A 3,000-MW power plant running on crude brown coal causes the following releases on an annual average when there is no contaminant separation: 20,000 tons of dust, 200,000 tons of SO_2, 2 million tons of ash, and 40 million tons of CO_2.

Practically Emission-free

As an important indication of such adverse ecological effects, let us just mention here the carrying by air currents of sulfur dioxide over long distances and the associated damage to forests and bodies of water. Also closely connected with such emissions is the emission-caused damage to buildings, equipment, and so forth.

Total losses arising from corrosion represent about 1 percent of the gross national product of the GDR--which was almost 8.5 billion marks in 1981. Furthermore, groundwater-lowering measures on an enormous scale are necessary as follow-up actions in coal mining, and these actions may be associated with negative consequences to agriculture and forestry as well as to the supply of drinking water and industrial water.

As for the emission of radioactive substances, Soviet energy experts have determined that the natural radioactive substances from the earth's crust that are necessarily uncovered in supplying conventional power plants with fossil fuels produce the same level of radiation exposure as nuclear power plants. A comparison has been made concerning relative adverse pollutant effects, with the same electrical output being assumed for the various types of power plant in each case. Based on this comparison, in terms of pollutant emission the generation of energy from NPP's is more satisfactory by a factor of 1,000 than generation from coal and oil power plants, and more favorable by a factor of 100 than that from natural-gas power plants.

12114
CSO: 5100/3014

YUGOSLAVIA

PLANNED NUCLEAR POWER PLANT CONSTRUCTION DESCRIBED

Zagreb VJESNIK (SEDAM DANA supplement) in Serbo-Croatian 7 Dec 85 pp 2-3

[Article by Salih Zvizdic: "Yugoslavia on Line"]

[Text] Yugoslavia has finally made a firm decision to buy a nuclear power plant (NE). And not just one, but four, and all four the same as the first, which is to go under construction in 1988 at Prevlaka on the Sava, some 30 km downriver from Zagreb. The decision on the program for construction of four NE was made after nearly 10 years of various analyses and the proceedings of commissions, among them the well-known Kraigher Commission.

The basic propositions as to what we desire from the nuclear program are mostly well known. An agreement was reached at the level of the republics and provinces that all four NE must have the same nuclear fuel cycle and a standardized system of reactors. Within that context of what was known, there remained many unknowns, and the answers can come to us only from the final analysis of the bids of foreign contractors who will help us to build the power plants.

As soon as they study all the bids our specialists will decide whether it will be nuclear power plants using natural or enriched uranium. If they decide on natural uranium, then in that case a choice has to be made between two systems of heavy-water nuclear reactors, one of them Canadian (CANATOM), and the other West German (KWU, Kraft Werk Union). If the specialists opt for light-water nuclear reactors, then there are three types of such reactors involved, and there are several bids for them. There is practically no difference in efficiency and commercial utilization of these nuclear plants, so that the preference will go to suppliers offering better credit terms and other conditions. Nor has the method of financing, in dinars and foreign exchange, yet been determined for the four nuclear power plants. Nor are the sites known except for Prevlaka.

The international competition for construction of four nuclear power plants in Yugoslavia was advertised on 25 October 1985 in SLUZBENI LIST SFRJ [OFFICIAL GAZETTE OF THE SOCIALIST FEDERAL REPUBLIC OF YUGOSLAVIA]. So far the documentation has been purchased by eight of the world's suppliers, two each from Japan and France, one each from the United States, Canada, Italy, and West Germany, and the bid of one other firm from the United States is expected, as well as bids from the USSR and Sweden. Ten domestic work organizations have also applied: "Djuro Djakovic" of Slavonski Brod, "Jugoturbina" of Karlovac, INA and "Rade Koncar" of Zagreb, "Energoinvest" of Sarajevo, MINEL of Belgrade, "Gosa" of Smederevo, MIN of Nis, "Slovenija ceste" of Ljubljana, and "Metalna" of Maribor. The foreigners purchased the documentation at $20,000, and domestic bidders for 600,000 dinars.

"I can say with full responsibility that this international competition is by no means a 'reelection of a well-known candidate,' but an open bidding in which all have equal prospects, but this job will go to whoever makes the best offer," says Zarko Petrovic, engineer, coordinator of the working group for construction of the "Prevlaka" NE, but also one of those responsible for building the other nuclear power plants.

For and Against

Aside from the group of specialists and individuals who oppose construction of nuclear power plants on ecological and safety grounds, there is also a group of specialists in Yugoslavia who oppose it on economic and financial grounds, as shown by the discussion held on 19 November in the Center for Engineers and Technicians in Belgrade. These others are afraid of new "Obrovaces" and "FENI's."

All that can be offered the ecologists is the evidence, in addition to the more than 300 existing nuclear power plants in the world, and the additional 126 that are now under construction, is that the new nuclear power plants are much safer than the first ones. The statistical data on the safety of these power plants is quite convincing, especially since there have been no very serious accidents even in the first "child's steps of nuclear power plants," with the exception of the American Three-Mile-Island plant. At the same time, in certain countries the Green Movement, which has taken a position of fierce opposition to the construction of nuclear power plants, has in addition to its ecological coloring, a very strong political coloring as well that is independent of ecology.

Here are some figures on the number of nuclear power plants in the world: the leader is the United States with 86 NE, the USSR with more than 45, France 41, Great Britain 32, Japan 31, West Germany 19, Canada 16, Sweden 10, Spain 7, GDR 6, Bulgaria 5 (they are completing a sixth on the Danube), Switzerland and Belgium 5 each, Finland and Czechoslovakia 4 each (another 4 are under construction in Czechoslovakia), Italy 3, Poland and Hungary 2 each, Yugoslavia 1...and so on.

The answer for those "afraid" about the economic and financial future of large nuclear investment projects, and they are above all demanding that natural resources of other sources of energy (coal, water, and petroleum) be used first, since they are more profitable, is that the nuclear power program in our country is an expression "not only of pure economic logic, but in fact of pure economic necessity." Even much more advanced countries are not yet counting seriously on power obtained from windmills and solar energy, and the countries with a surplus of petroleum, coal, and gas are speculating more and more with those commodities. Coal in Yugoslavia will only last a few more decades, and even today we do not have enough petroleum and gas. Moreover, there remains very little unutilized hydroelectric potential in our country. In connection with all of this we must assume an annual growth of power consumption between 3.5 percent (the pessimists) and 8.5 percent (the optimists).

Croatia is subject to the greatest energy threat in Yugoslavia. Coal from Istria is used by TE [thermal electric power plant] "Plomin," and all of it will be gobbled up by the new TE "Plomin 2." It is not possible to count in a commercial way on the small reserves of coal in the Zagorje mines, since among other things they are mostly underwater. As for hydropower, Croatia can count on only an additional 1,000 MW, and that would be at 36 sites! Those sources could yield an additional annual output of 4 billion kwh, but even this year our republic is consuming about 14 billion a year, while in the year 2,000 it will be consuming 29 billion!

"Nuclear power has not entered Yugoslavia by the back door, but quite openly and after many discussions. There are the resolutions of the SFRY Assembly in 1977 on this question, and then the agreement among the republics and provinces on the place of nuclear power in Yugoslavia's energy policy, which dates from 1982, and then many commissions and projects, and all of this was made known to many people and the broad public," Zarko Petrovic said.

Who Is Paying How Much?

Aside from Montenegro, which still has sufficient unutilized hydropower, and Kosovo, which has sufficient reserves of coal, the other five republics and the Province of Vojvodina agreed in 1982 that by the year 2003 they would jointly build a total of four NE, each with a capacity of 1,000 MW (for the sake of illustration the present NE "Krsko" has a total power of 664 MW, Slovenia and Croatia each being entitled to 332 MW).

There have been many discussions on the topic of how many nuclear power plants, 12, 8, or 4, and then whether reactors should be chosen with greater or smaller capacity (many favored a capacity of 440 MW). The view finally prevailed that we should decide on 1,000 MW primarily because of the lower price per unit investment, although there does exist a mild alternative to this solution.

A calculation shows that the four NE, together with the use of energy from other energy resources, could cover the growth of consumption up to the year 2003. The first at Prevlaka will be built by 1995, the second by 1998, the third by 2001, and the fourth by the year 2003. But since the five republics and the Province of Vojvodina possess differing sources of "conventional" energy, their share in financing the construction and use of power from these power plants also varies. Thus Bosnia-Hercegovina, Macedonia, and Serbia proper will each have a 10-percent share of the financing, Slovenia 12 percent, Vojvodina 21 percent, and Croatia 37 percent. These percentages at the same time indicate the reserves of energy sources in those republics and that province.

Aside from the location of NE "Prevlaka," which has been clearly defined, the others have been only suggested. One more nuclear power plant will be built in Croatia, and that at one of these three sites: Vir near Zadar, Vrankso Jezero, or the island Pag. The others will most likely be built near Dalj or Bogojevo (two neighboring places on the banks of the Danube), and then at Smederevo on the Danube, while in Macedonia Krivolak on the Vardar (downstream from Titov Veles) has been chosen.

Slovenia did not agree to go half-and-half with Croatia on the 1,000 MW from NE "Prevlaka," but will take only 332 MW (the same as their half of NE "Krsko"), and since Croatia has taken 500 MW, another 168 MW will be available. Bosnia-Hercegovina, Vojvodina, and the central heating system of Zagreb are potential candidates for those 168 MW.

We are building four nuclear power plants under rather favorable financial and credit conditions in the world, quite different from those at the time when Krsko was built (1974-1981), when Yugoslavia went out looking for contractors and creditors for the work, while today--because of the crisis of nuclear energy in the world--they have come looking for us. The nuclear energy crisis was not caused by a failure of nuclear power in the world, but by surplus capacity for generating electric power in the advanced countries. For example, in the United States in 1982 surplus power generating capacity amounted to 33 percent, and at the same time the annual growth of consumption fell from 6 to 2 percent because of the higher cost of energy. All of the Yugoslav tenders in the international competition for four nuclear power plants in Yugoslavia explicitly stated that the company which takes responsibility for this work must guarantee not only to equip the reactor and a uniform nuclear fuel cycle, with all the details of production and fuel consumption, but must assume an obligation to include the most recent scientific advances in the construction to keep up with the development of nuclear power plant construction. In addition, the bidder must pass on the knowledge and experience of the most up-to-date technology to Yugoslav work organizations, some of which ("Dj. Djakovic," "Metalna," "R. Koncar," "Jugoturbina," and others) already have experience in building the NE "Krsko." In addition, it is assumed that our work organizations could produce and install even about 80 percent of the equipment for the fourth power plant. In addition to that, plans call for gradual independence with respect to the fuel cycle as well.

According to present calculations, the price of one nuclear power plant, if we had cash, would be about $1.8 billion. But if we take credits into account (it is assumed that about 40 percent would be borrowed abroad), and then the foreign exchange components in the equipment which our factories will make, and then the interest during the period of construction and the regular interest, the price of the four nuclear power plants would range at about $15 billion. The debt would be repaid over a period of 15 years from the time each plant goes on line. From a commercial standpoint our demand that the foreign contractors take 85 percent of payment for equipment and work items in the form of deliveries of various goods is very challenging.

In the present situation those 85 percent seem to be the most complicated problem for us, since the foreign companies accept that demand of ours in principle. This is a great opportunity for our economy, but the question is how to take advantage of it: Our past experience in this regard has not been brilliant.

The Experiences of Krsko

As conceived by specialists in the electric power industry, the dinars to build the four nuclear power plants would have to be furnished "exclusively through the regular mechanism of assembling resources for development of the electric power industry" (through the institution of the present self-managing communities of interest), since no sort of domestic banking or commodity credits come into consideration under the conditions of today's high interest rates.

According to this conception, the foreign exchange would be furnished by exporting goods, and the electric power industry would pay the exporters dinars for the exchange they have earned in that way. ("Electricity is built into every production operation," Z. Petrovic explains.) A specific "Yugoslav model," which in fact was mentioned in the recent resolutions of the SFRY State Presidency, has been built on that kind of financing and distribution of the power from the future power plants.

In any case, advantage will be taken of the experience gained in the financing and operation of our first nuclear power plant. The total investments in that NE amounted to about $515 million. But by this point that amount has grown to $1.15 billion, but because the debt has been rescheduled at the level of the SFRY, the principal is still not being paid off, but only the interest, which amounts to about $20 million a year. In addition, a third of the nuclear fuel is changed annually in accordance with the usual technology, and about $25 million are paid for that.

In spite of losses, our first plant at Krsko has a high degree of capacity utilization (about 85 percent), and as many as 116 power plants in the world have recorded poorer operating results. All of those elements, which Ivo Medvedec, engineer and Croatian representative in the duet of directors, spoke about at length were taken into account in designing the financial package for our nuclear program up to the year 2003.

Our specialists are looking attentively at the possibility of construction after the Canadian-Turkish model, since the Canadians offered to build a nuclear power plant for the Turks at Akkuyu with their own capital, and then the Turks would allow them to dispose of 60 percent of the power generated at that plant as they chose. The Canadians would sell that power at the going rates of power from conventional sources to the Turks or abroad. When the nuclear power plant is paid off in that way, and that takes approximately 15 years, it would become Turkish property. (Incidentally, the life of a nuclear power plant is about 30 years, and then its fuel equipment needs to be replaced.)

This model deserves attention because of the financial plan, which is rather painless for the host country in the investment phase. That model, should we decide on it, might certainly come into account with other equipment suppliers as well.

The nuclear program has started out in quite serious fashion. The international competition lasts until 25 June of next year, and then a special commission of experts will by the end of the year propose to the Federal Executive Council its choice of fuel cycle and reactor, and construction would begin shortly thereafter. This scheduling of the work is firmly fixed at present. Any postponement or lag would be expensive for us; the annual growth of electric power consumption is even today greater than the possibility of producing it at the facilities which have been built.

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CSO: 5100/3013

O GLOBO: NUCLEAR MISSILES POSSIBLE IN 5 YEARS

PY150013 Rio de Janeiro O GLOBO in Portuguese 13 Jan 86 p 14

[Text] Brasilia -- Brasil could have nuclear missiles in 5 years. A space science cooperation agreement signed with the PRC last year will make it possible for Brazil to develop solid-fuel offensive missiles with nuclear warheads, which are technologically similar to missiles manufactured in the United States in the 1960s.

Under that agreement, Brazil will transfer solid-fuel technology to the PRC. In return, the PRC will transfer to Brazil advanced technology on liquid fuels and rocket-guidance systems that have been developed in the past 20 years. With the PRC technology and fuel, Brazil could manufacture a nuclear missile in a few years.

At present, the PRC nuclear shield is composed of liquid-fuel missiles, capable of hurling heavy payloads at greater distances than those possible with solid-fuel rockets. Their drawback, however, is that the liquid-fuel rockets cannot be safety stored because the liquid fuel is unstable and can explode easily. The difference in launching time between the liquid-fuel and the solid-fuel rockets is noticeable. A Minuteman III, one of the most modern U.S. missiles, can be launched in 2 minutes, while the CPR-SSBM-1-N, as the most powerful PRC missile is called, requires 20 minutes, minimum.

In 20 minutes, a ballistic missile travels half the distance of the earth's circumference, so the PRC atomic shield is militarily ineffective.

The Brazilian solid-fuel would make a difference for the Chinese. In return, the program being developed by the National Institute of Space Research in Brazil will gain an appreciable advantage: A rocket that is capable of carrying a 1,000-kilogram satellite up to operational altitudes.

The cooperation agreement has a military aspect that is important, because the space rocket guidance system with minor modifications can be used for offensive missiles. If this guidance system is added to the solid-fuel know-how the Aerospace Technology Center (CTA) has developed, Brazil will have missiles that are accurate enough for military use.

This plan however, has two obstacles: in Brazil there is no enriched uranium or plutonium for the manufacture of an atomic bomb, which is not under the control of international organizations, and the Brazilian Government has no intention of developing, through the Armed Forces, specific research with this goal in mind.

The Navy Research Center, in cooperation with the Institute of Nuclear Research of Sao Paulo University, is working on a process of enriching uranium through laser rays. The material obtained would be used in a nuclear submarine carrying torpedoes and antiship missiles. So far, the practical results obtained have been few, although the project for a 12-megawatt naval reactor has been completed.

The Air Force enriches uranium in Sao Jose dos Campos by ultracentrifugation methods. The idea is to use this process to manufacture fuel for the artificial satellite which will be launched from the Alcantara base in Maranhao, in 1987.

According to nonofficial data leaked by the CTA, this process of producing enriched uranium is already economically feasible, with even greater productivity than the fuel sold by the Kraftwek Union to Brazil through a nuclear agreement signed with FRG at the end of the Geisel administration.

On the other hand, the Army is trying to produce fission nuclear reactors, using plutonium as fuel, according to the newest pure physics techniques.

Of all these programs, only that of the Air Force could have any impact on the production of a nuclear device. However, according to nonofficial sources, this could only be done if a nuclear power appeared in the Southern Hemisphere -- read Argentina and South Africa.

Only in these circumstances would the CTA, which is not under international control, begin to produce solid-fuel missile warheads, based on the VLS -- The Brazilian space rocket -- which will be launched in 1987.

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CSO: 5100/2035

DHAKA ENERGY MEETS ADVOCATES NUCLEAR POWER INCREASE

Ershad on Rooppur Project

Dhaka THE BANGLADESH TIMES in English 22 Nov 85 p 1

[Text] President and Chief Martial Law Administrator Lt Gen H.M. Ershad said on Thursday that the Government was sincerely working for the implementation of Roopur nuclear power project.

"It has not been shelved," President Ershad said, and added that efforts were being made for pooling assistance from the friendly countries for the implementation of the project. "We have made considerable progress in the regard."

President was inaugurating the four-day international conference on energy development planning for Bangladesh at the Institute of Engineers auditorium.

President Ershad said nuclear power project of Bangladesh was absolutely for peaceful purposes. It was designed to help meet the country's energy requirement with a view to improving the condition of the people.

President Ershad appealed to the friendly countries to assist Bangladesh in the implementation of Rooppur nuclear power project.

Participants' Comments Reported

Dhaka THE NEW NATION in English 22 Nov 85 pp 1, 8

[Text] Participants in an international conference on "energy development planning for Bangladesh" yesterday suggested immediate appropriate steps for introducing nuclear power in the country so as to make 'cheap electricity available at the doorstep of common man.'

They said nuclear power was not only a viable and attractive proposition technically and economically but also a foreign currency saver as it would reduce dependence on imported energy significantly.

Presenting their paper jointly on 'need and choice of power reactor for Bangladesh' at the second technical session on the second day of the four-day conference, Anwar Hossain, M.A. Quaiyam and C.S. Karim of Bangladesh Atomic Energy Commission said introduction of nuclear technology could give a boost to the overall economic activities of the country.

In all five different papers on different aspects of energy were presented by Dr Saifur Rahman, Mr S.T.S. Mahmood, Mr Q. Ahsan, Prof A.M.Z. Huq, Dr Milton Levenson and Dr Anwar Hossain, Mr M.A. Quaiyum and Dr C.S. Karim at yesterday's second session which was chaired by Prof D.P. Sengupta and co-chaired by Mr M.A. Rahman.

Pointing to the usefulness of nuclear power, Mr C.S. Karim said its share in electricity generation in fact acted as a vital mechanism in overcoming the energy crisis and moderating the energy pricing.

He cited an instance and pointed out that nuclear power stations commissioned between 1972 and 1982 helped reduce the demand for oil by about 550,000 ton per day which is roughly one quarter of the total reduction in oil production by OPEC countries.

By early 1984, total annual electricity power generations of all the nuclear power plants of the world exceeded one trillion kilowatt hours. Had the same energy been produced by oil-fired plants, this would have required a daily consumption of 700,000 tons of oil, he said.

The paper observed that the natural gas resources of Bangladesh would not be sufficient to generate the required electricity after meeting its demand for industries, domestic commercial sectors and particularly production of fertilizer and underlined the necessity of diversifying electricity generation sources.

It also pointed out that for a coal-fired plant with a capacity of 300 mwe running at average plant factor of 70 percent the transportation system of the country would have to be equipped to handle and transport about 800,000 tons of coal annually if local coal was not available by that time.

Oil under no circumstances can complete with either gas, coal-fired or nuclear power generation, the paper said, adding "it therefore, almost a compulsion for Bangladesh to introduce nuclear power immediately if the situation has to be improved in real sense."

The experts of the Atomic Energy Commission referred to the experience of USSR, Argentina, India and Finland which had shown technical and economic viability of reactors in SMPR range and said although the initial capital investment in case of nuclear power plant is higher compared to a conventional plant, the lower fuel cost and the associated economic advantage outweigh its disadvantage of higher forecast.

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CSO: 5150/0044

REPORTAGE ON FAST BREEDER REACTOR AT KALPAKKAM

Dedication, Rajiv Speaks

Calcutta THE STATESMAN in English 17 Dec 85 pp 1, 9

[Text] MADRAS, Dec. 16.--"Mrithyorma Amritamgamaya" (lead us from death to immortality), intoned Mr Rajiv Gandhi while dedicating to the nation the fast breeder test reactor and the 235 MW second unit of the Madras atomic power plant at Kalpakkam, about 50 km from here, today.

Splitting of the atom had given immense energy to mankind. "This energy should be used for human welfare and not for destruction", the Prime Minister said and reaffirmed India's policy of using nuclear energy only for peaceful purposes.

"Our scientists have built at Kalpakkam a new monument, a new temple of modern India, a symbol of our commitment to progress", said Mr Gandhi and added "The question before us today is whether we would be able to deal with what we have created with our scientific strength".

Planting a banian sapling to mark the occasion, Mr Gandhi rechristened the reactor research centre as Indira Gandhi Centre for Atomic Research in the presence of a galaxy of nuclear experts, both national and international, including Dr Hans Blix, Vienna-based director-general of the International Atomic Energy Agency, Dr Munir Ahmed, Chairman of Pakistan's Atomic Energy Commission, and Dr Georges Vendryes, Advisor to the French Atomic Energy Commission.

Recalling the Delhi declaration on the peaceful uses of nuclear energy signed by leaders of six nations, including Indira Gandhi, Mr Gandhi said whether it was the Madras atomic power plant, the fast breeder test reactor or any other reactor, India was committed to their uses for constructive purposes only. "Our abhorrence to nuclear weapons and war is total", he declared.

Commissioning of the Rs 68-crore fast breeder test reactor, designed entirely by Indian scientists and using indigenously mixed carbide fuel with a plutonium and uranium base, instead of enriched uranium, marks India's joining the select band of six countries--the USA, Soviet Union, France, Britain, West Germany and Japan--possessing such sophisticated technology. China is yet to venture into the fast breeder field.

Mr Gandhi said the progress achieved in atomic energy in the country should reach every sector of the economy--industry, agriculture and research and development. Such progress must be used as a vehicle for spreading the scientific temper and for the uplift of the people, he said.

Mr. Gandhi said India, proposed to ensure that at least 10% of the country's energy generation was from nuclear source by the year 2000, and hoped the fast breeder test reactor would give the necessary impetus to achieve this goal.

Recalling the vision of the late Homi Bhaba, who had first thought of the fast breeder technology, Mr Gandhi said the country should take a leap ahead so that it could catch up with the next generation technology.

Mr Gandhi congratulated the nuclear scientists for their achievements and said the track record of the Department of Atomic Energy had been good. It had passed on the fruits of research and development to the industry and collaborated successfully with the private public and joint sectors for indigenous design and fabrication.

Nuclear energy had given us "cheap, safe and clean power", said Mr Gandhi. Even in the field of preserving the environment, the country's nuclear scientists had established a good record.

"At Kalpakkam, you have created energy from the atom and not far away from here, at Mahabalipuram, our forefathers had built the shore temple to harness spiritual energy", Mr Gandhi said. "The question before us today is whether we will be able to deal with what we have created with our scientific strength", he added.

Though the Department of Atomic Energy had come a long way from commissioning of the Rajasthan atomic power station to that of the Madras atomic power plant, there were areas where the progress left much to be desired, Mr Gandhi said. These included dependability, rectification of faults, management systems and inventory controls and hoped the scientists would pay special attention to rectify the shortcomings.

Dr Hans Blix described the opening of the Indira Gandhi Centre for Atomic Research as a milestone in the development of nuclear science and technology whose significance extended far beyond the frontiers of India. "It is a truly remarkable achievement and shows what can be accomplished by a developing country in the nuclear sphere when the determination and dedication is there. Nuclear power and nuclear science are not for the rich countries alone", he said.

Mr Georges Vendryes said plutonium-uranium carbide held great promise for nuclear power generation. "India could be world leaders in this fuel development and France is very much interested in the results of the fast reactor at Kalpakkam".

Mr Vendryes said if India wanted any collaboration with France on transfer of technology, his country was ready for discussions.

Dr Munir Khan disclosed that Pakistan was building a light water 900 MW nuclear power plant with enriched uranium as fuel, which theoretically made the country capable of making nuclear weapons. He said the enriched uranium would be made available from internal sources.

Dr Raja Ramanna, Chairman of the Atomic Energy Commission, spoke of India's nuclear programme and the role of the fast breeder reactor in future nuclear energy development plans. He said that Indira Gandhi would ever be remembered as the main architect for the growth of science and technology in India, particularly in the field of nuclear energy.

Dr C. V. Sundaram, Director of the Reactor Research Centre, explaining the salient features of the fast breeder test reactor, said the sodium-cooled, plutonium-fuelled loop-type reactor was designed to produce 40 MW of thermal power and 13 MW of electrical power. He added that power generation was not the only goal in building the test reactor.

The test reactor was being operated at low power in order to measure the reactor physics characteristics of the core which uses a new carbide fuel. The reactor physics measurements being made and also to be made later were expected to yield a wealth of information which would be used to develop the capability for fast reactor design studies in India.

Dr Sundaram said a commercial fast breeder reactor could generate power at competitive prices only if the maximum possible energy was extracted from its fuel bundles.

The Tamil Nadu Governor, Mr S. L. Khurana, and the Chief Minister, Mr M. G. Ramachandran, were among those who attended the function.

After the dedication ceremony, an international symposium on "fast breeders as a future source of power" was held at Kalpakkam in which, apart from the Secretary-General of the International Atomic Energy Agency, representatives of the six countries having on-going fast breeder research programmes, besides scientists from many Asian countries, including Pakistan, Bangladesh, Indonesia, the Philippines and Malaysia participated.

The Prime Minister arrived in Madras at noon on a nine-and-a-half hour visit after participating in the World Kannada Conference in Mysore.

After dedicating to the nation the fast breeder test reactor and the second unit of the Madras atomic power plant at Kalpakkam, he followed it up by dedicating the Rs 170-crore expansion project of the Government of India owned Madras Refineries at Manali, on the outskirts of the city, which increased its crude processing capacity from 2.8 million tons to 5.6 million tons a year.

Speaking at the MRL function, Mr Gandhi disclosed that RS 12,500 crores would be spent on oil exploration and development during the Seventh Plan, which was twice the allocation for the previous plan. "We must now ensure that we get good returns on this investment", he said.

Mr Gandhi said the country would be self-sufficient in energy by 1990. He called for fuller capacity utilization and better fuel efficiency methods to meet the growing energy needs of the industry and agriculture.

The MRL has also set up a refinery engineering school of training, the first of its kind in India, on the lines of AMOCO's School of Engineering and Technology at Naperville, near Chicago.

Laying the foundation for an auditorium commemorating the 150th anniversary of the Madras Christian College Higher Secondary School here this evening, the Prime Minister called for a change in the present system of elitist schools for the privileged few designed during the colonial era and wanted good education to be made available for all. He pointed out that there were schools which lacked even basic facilities like blackboards. He said education should inculcate the spirit of dignity of labour which was lacking in Indian students.

Message from IAEA Chief

Madras THE HINDU in English 16 Dec 85 p 1

[Text] MADRAS, Dec. 15. In a message sent to THE HINDU for publication, Dr. Hans Blix, Director-General of the International Atomic Energy Agency, which has its headquarters in Vienna, commends the scientific and technological development being underlined at Kalpakkam today:

"The inauguration of the Indira Gandhi Centre for Atomic Research is a milestone in the development of nuclear science and technology. Its significance extends far beyond the frontiers of India alone: it is a truly remarkable achievement, and shows what can be accomplished by a developing country in the nuclear sphere when the determination and dedication is there. Nuclear power and nuclear science are not only for the rich countries.

"For a long time, India has had a very ambitious programme for nuclear development. Now with the commissioning of the Kalpakkam fast reactor, your country is taking another very significant step forward. This reactor has some features in common with plants in other countries, but in other respects it is unique--for example, in its use of a carbide fuel of Indian manufacture. Rather than waiting for others to develop fast reactors of a size and type which would lend themselves to deployment in Indian circumstances, Indian research workers have done the job themselves. The world scientific community will be keenly interested in reports of the experience acquired.

"On behalf of the International Atomic Energy Agency, I congratulate all concerned with this venture, wish you every success in the future, and assure you of our continued support.

Hans Blix"

It may be recalled that in his address to the IAEA's general conference in Vienna on September 22, Dr. Blix observed: "One should not forget...that uranium resources, like oil, are finite and I think we should note with appreciation that the world's experience of breeder technology--which could make uranium resources go very far--is further expanding this year, with Superphenix having gone critical and India inaugurating a new test breeder reactor near Madras."

Symposium

Heads of the nuclear establishments of over ten countries are to participate in a symposium on fast breeder reactors starting at Kalpakkam on Monday.

Among those attending the three-day symposium will be Dr. Hans Blix, and the Chairman of the Pakistan Atomic Energy Commission, Dr. Munir Ahmed Khan.

Three of the seven nations other than India, which have built or are building fast breeder reactors, have not sent delegates to Kalpakkam. They are the United States, the Soviet Union and Japan. France, Britain, West Germany and Italy will have delegates attending the symposium, which is to begin soon after the Prime Minister's visit to the Kalpakkam complex.

Interview with IAEA Director

Madras THE HINDU in English 16 Dec 85 pp 8, 9

[Text] The International Atomic Energy Agency (IAEA) which has its headquarters in Vienna is the keypoint body for international cooperation in the peaceful applications of nuclear energy within the context of the discriminatory non-proliferation regime. It is an intergovernmental organisation with well over a hundred members, and functions autonomously within the wider United Nations system.

By virtue of its mandate, the IAEA's work excludes anything connected with the non-peaceful, military side of nuclear energy. Its basic work is to foster and encourage, guide and advise on the development of the peaceful uses of atomic energy round the world. Functioning in a somewhat contentious field, it is a forum for the enactment of controversies and certain differences in outlook and experience.

Recently, N. Ram, interviewed for THE HINDU the IAEA's Swedish Director-General, Dr. Hans Blix, in Vienna. He is now visiting New Delhi for talks with the Prime Minister and other Government representatives and also Kalpakkam to participate in a symposium on fast breeders as a future source of power:

N. Ram: Dr. Blix, over the past four years during which you have led the IAEA, what are the principal gains for the international organisation? I refer particularly to the assessment put forward at the NPT Review Conference (Third Review Conference of the parties to the Non Proliferation Treaty held in Geneva in August 1985) that the IAEA is the principal agent for technological transfer in this field and there might be other activities as well where gains came about. How would you sum up these principal gains and could you indicate some kind of perspective for the decade ahead?

Hans Blix: If you take first the developing countries, in these last four years the budget for technical assistance and the implementation of technical assistance programmes have gone up very fast. And this compares very well with other international organisations. We are giving increasing help on the question of using isotopes to find water. We are giving increasing help to the eradication of Medflies, increasing help to the use of nuclear medicine, more help also in the field of energy planning. In the nuclear power field, we have instituted new methods in advising governments on the safety of nuclear power reactors in the so-called Operational Safety Review Teams (OSART). We are also giving advice in radiation protection advisory teams, the so-called RAPAT missions. And we have set up the Incident Reporting System through which the experience on incidents and anomalies is exchanged. Now all this is an exchange of experience and, to some extent in many of the programmes, also a transfer of technology. So I think we have continued on the good path on which the Agency was under my predecessor, but we have expanded it. And we have maintained, and I would even submit increased, the efficiency of the Agency. Now this is the bread-and-butter activity, the down-to-earth activity.

Then, of course, the Chinese accession to the Agency is a very important event. And I think that the Soviet offer to submit some of their peaceful nuclear installations to (IAEA) safeguards is also a very important event. I know that in India and in many other countries they are saying that Agency safeguards inspection in nuclear weapon states does not reduce the number of nuclear bombs! Or doesn't bring any nuclear disarmament. And this is true. I am, however, of the view that the Agency is gaining experience on installations which we would otherwise not see; secondly, there is a feeling of a somewhat greater equity between the non-nuclear-weapon states submitting installations to safeguards and the nuclear weapon states.

And perhaps even more important, the experience we gain in inspection in nuclear weapon states is something that would one day be very useful in the context of disarmament. It is a precedent that nuclear weapon states accept verification. This is very important. Therefore I am happy that we are allowed to start this in the Soviet Union, and we have now also an invitation from China for talks...

Revocable agreements

The agreements we have with the four nuclear weapon states are not irrevocable. They have retained for themselves the right to move installations out of safeguards. It has not happened so far (as far as I know) but they have retained that right which, of course, makes it a different kind of thing from an installation that is submitted irrevocably to safeguards--under bilateral agreements or under NPT. But to me the particular value lies in the precedent. This, after all, is the world's first international verification system--that is a plant one has to care for tenderly.

Dual role

Q: With reference to the IAEA's well-known dual rule or two of its main roles--one which can be called 'promotional', the other related to safeguards, 'regulatory'. You have referred to it in various addresses: one is to promote the peaceful uses of nuclear energy, the other is to see that it is not used for military or destructive purposes. There has been a certain amount of criticism of the balancing of the two roles--reflecting not so much your own choice as the fact that the IAEA is bound to reflect a certain unequal global nuclear bargain. How do you see the situation today in relation to the strong support you have got in the main, and also in relation to the criticisms about the failure to balance these two roles?

Blix: Well, it's right that we often refer to the twin roles of the Agency--to promote the peaceful uses of nuclear energy, and to help in the efforts to impede the military uses. I think one must however keep in mind that these two reinforce each other. I think that safeguards are promotional of the use of nuclear energy. If you did not have safeguards, a number of things would not be sold. Nuclear trade would be enormously more difficult than it is today. So the fact that safeguards are there facilitates the expansion of the peaceful uses of nuclear energy. At the same time, the peaceful use of nuclear energy--nuclear power, for instance--reduces the shortage of energy, and energy is an important factor in many countries for peaceful development. If the pressure on oil resources were to increase (as it would if there weren't any nuclear energy), then the risks of friction would be even greater. So I think they reinforce each other. And I'm not quite accepting that they stand against each other.

Now the other point you ask about is: if you look at what are safeguards and what are other types of activities whereby we promote the use of nuclear power or other uses of nuclear energy ... well safeguards are up to some $30 millions a year in our budget; the technical assistance money is a little more than that. And also, in our regular programme, we have a fair amount of money that is devoted to developing countries directly. But all the rest is what you might say is promotional. Now some people say there should be balance--the same amount for technical assistance as for safeguards. My view is that there is hardly any limit to how much we could spend on technical assistance at least in the longer run; we cannot increase it drastically in the short run. For safeguards I don't think the Agency has a reason to ask for more than is needed to carry out the safeguards as a credible operation. I think we will need more than we have now, but there is certainly some limitation on how much we will need. On the promotional side, almost the sky is the limit!

Q: Regarding the application of safeguards, while there have been some controversies in the past about the scope of safeguards which is really a supplier-related problem ... while that may be, the safeguards have worked in that all your outstanding issues have been resolved in their application where they have been accepted. To what do you attribute this fact, because earlier, I think there were fears, certainly in the United States, that IAEA safeguards might not be 'adequate'. On the part of the developing countries also, there might have been some fears.

Blix: Well, essentially I see safeguards as a service to member states, to enable them to demonstrate with the maximum credibility that the installations which are submitted to safeguards operate in a peaceful manner. Therefore there should not really be any controversy or even friction between the country that has accepted the safeguards--whether over all its installations or over particular installations--and us, in the way it is to be carried out. Because there is the joint interest that this shall be credible. Now in practice, the world doesn't look quite as good as that. We do have our discussions with states about how much is needed, where are we to place cameras, can we develop the films in the country, can we not do that? So we do have a number of problems with this, but there is nothing that detracts from the efficacy of safeguards.

Divergent interests

Q: You emphasise the fact that the IAEA performs varied services for the member countries and this involves a certain attempt to harmonise divergent interests. Do you see them as terribly divergent or converging or ...

Blix: Well, the CAS (the IAEA's Committee on Assurances of Supply) is the forum where the interest of the consumers, the importing states, in having a reliable supply of fuel or technology or hardware is put up on the one hand; and the interest on the suppliers' side in continuous and credible safeguards, guarantees, on the other hand, is expressed. And that has made some progress. But there is still some way to go, so there is room for harmonisation. On the question of an international plutonium storage, there is also the interest of those who feel that increasing quantities of plutonium in the world are something to worry about and who would like to see not only the ordinary safeguards upon the plutonium but an additional seal, a declaration on the part of the country that if it takes out something from the plutonium stored, it would declare why it took it out and what it used it for. On this also, the governments within the Agency have not reached any agreement at the present time. So there remains room for harmonisation.

Safety, waste disposal

Q: Looking forward to the next decade, what are the major things that you would like to see solved so far as the IAEA is concerned?

Blix: Well, I am very keen on the small and medium sized power reactor question. I remain of the view that an expansion of the use of nuclear power in the world, including the industrially more advanced developing countries, is very important. We cannot, however, afford such an expansion without an absolutely maintained safety. Because any accident, whether in the United States or in developing countries, is going to hurt nuclear power everywhere. And therefore the introduction of nuclear power into developing countries will have to be done with a great deal of prudence. But I'm certainly in favour of it.

There are many developing countries that do not have other possible resources and I feel that India's example and India's efforts in this direction are most impressive. And this also shows that a developing country can do it! Now India has an exceptional capacity in the scientific field and in the engineering field, but I think it could be emulated by other developing countries. We've seen how it works in Korea, in Taiwan and it can work in many other places. So this is an area where, with prudence, one ought to go forward.

The waste field is another one where I would hope for more international cooperation. I think we have been successful in the field of safety--both on the regulatory side, in drafting safety regulations etc, and in our actual services to member states. In the waste field we have done much less. It has not been a lack of ambition, but the fact is that governments, out of regard, I think, for public opinion, have not been very keen to consider the possibility of taking on the waste, or cooperation with other countries there. 'So we cater to our own problems, they are enough!' However, I think there would be many gains, economic and environmental, in greater cooperation and I see the Chinese offer, or opening to acceptance of foreign spent fuel or waste storage, as an interesting new departure. The Russians, of course, have taken spent fuel from Russian-made reactors for a long time and this, too, is some opening. I think there may be more of this in the future and the Agency should promote that.

Now these are two important areas. Food irradiation is a very interesting avenue and from the moment I came here, I've been enthusiastic about its exploration. That new method is now getting into gear and I think we are approaching the moment when it will be industrially used.

Q: There are a number of public fears in this respect...

Blix: Yes, but the fears in this field--as the fears in the nuclear power field--are terribly exaggerated. This is a technology that one can use prudently and rightly ... I think I myself would personally be more concerned about the widespread use of different chemicals in the food industry than I am about the irradiation of it. Now, lastly, reverting to the safeguards system, I think that a further consolidation of our safeguards operations and an expansion of these to make them give the maximum credibility are desirable. We have made great progress, but I would like to see these operations further consolidated.

Information dissemination

Q: Now there is another area that interests us particularly as journalists--the information sphere. You are now the single largest publisher of information on nuclear energy. Would you consider this efficient in terms of the investment, and is it being used properly?

Blix: Yes, as a publisher I think we are doing all right. As a distributor, I am not so sure. Those who participate in our symposia etc., get the records, and through the records a description of what came about in the discussions ... and a number of people in the scientific community certainly get them. But as for some of the publications which are a little more popular, I doubt very much that the distribution reaches out far. There is room for considerable improvement here.

Q: In the latter half of the Seventies, there was much apprehension in Western countries--the U.S. Congress and so on, at that level--over the consequences of access to information by countries which had not acceded to the global nuclear bargain. But since then it appears these fears have subsided. Do you see any political problems involved in this in terms of access to science, technology and applications?

Blix: Well, I think with respect to applications in science and technology, what they don't want to reveal, they'll probably keep confidential! But, of course, we are the ones who are operating the International Nuclear Information System, the INIS. And that is a well-functioning operation, an enormously important thing. Everything is fed into these computers and any nuclear research institution around the world can just fire off a telegram or telephone call and they can get articles in a particular area coming over by teleprinters or by computers.

Buyer's market

Q: Now turning to another subject, you referred very clearly, both at the IAEA general conference and the NPT Review Conference, to the emergence of a buyer's market which was in notable contrast to the situation of, say, a decade ago. What are the implications? How did this happen, when did it happen, and is it a positive thing?

Blix: Well, the reasons, of course, are that the industrialised countries had anticipated a much quicker growth of electricity consumption than actually occurred. And therefore the dimension of the industry producing nuclear power reactors was larger than really was needed. It turned out to be so. They are therefore looking, all of them, to export markets--in particular to developing countries but also markets in Europe, say the Netherlands or Finland, which are now looking for power reactors. Now, it is good for the buyers that they can press the prices (down), because the sellers are very, very keen on the selling. So from their (the buyers') point of view, it is an advantage.

Q: And in the field of Small and Medium Sized Power Reactors (SMPRs) it has become...

Blix:...evident too. There is a strong interest on the part of the supplier countries in selling these.

Financing plans

Q: Then what holds back progress in the field of SMPRs?

Blix: Well, several things. For one thing, financing. It still is very difficult to dig up loans of the size that you are faced with here. A coal plant requires less money for the investment. It requires more money for running and buying the coal, but the investment is less. Therefore, if you are very hard up, you may be inclined to buy something that is cheaper, but in the long run will be more expensive.

Q: And the World Bank might finance it, which in this case it does not?

Blix: The World Bank has not said, of late, that they would not be willing to contemplate financing nuclear (power plants). On the contrary, at a seminar recently here, they said they would look at these things...

Q: I see.

Blix: Now other constraints, of course, relate to the infrastructure and the manpower in the countries that may be interested in nuclear power. And that is an area where we can be helpful--in training and so forth--but it is not something that you change overnight. So those are also important constraints.

Nuclear independence

Q. If we may now turn to the Indian programme and certain policy features in India, what is your overall assessment? I'm also going to ask you about the possible implications of something you have discussed before--this 'expensive' nuclear independence. In the context of such perceptions, what is your impression about the Indian programme, including its problematical side?

Blix: Well, you can draw parallels to other energy sectors. Take the oil sector. There were many countries which imported oil and which did not bother to build refineries. In an oil crisis of the political kind, if they were cut off by countries possessing refineries, well, then they were badly off! They might have wished they had built refineries. However the risk of that occurring nowadays is perhaps not so great because there are more suppliers in the oil market than there used to be. There are also many more refineries. And therefore a country deciding for economic reasons that it is just as well to rely upon foreign suppliers may perhaps still be all right.

Now the nuclear is not very different, in my view. Today with uranium prices being what they are, the economic incentives to go reprocessing are not all that great. If uranium prices go up, then the incentive will be greater. And, of course, if you view very far ahead and realise that uranium resources are finite, well then you may wish to make use of the slumbering energy that you have in the spent fuel. For the time being, however, it would seem to me that the fact that you have more countries in the world which can provide enriched uranium offers a greater measure of safety for a country that does not itself go for enrichment. And the lesser interest in reprocessing, for economic reasons, has also led to a diminution in the interest in such technology.

Now a big country that is establishing a very big nuclear programme may feel differently about it. It may feel that it wants to have the complete fuel cycle. Of enrichment, if it goes for enriched uranium, and of reprocessing. A country like Japan is evidently also going for a complete fuel cycle because it has no energy resources other than this. And for it, any stop in the provision of service from the outside would be regarded as a catastrophe. It is understandable that it would do the full (nuclear fuel) cycle. But many countries with smaller programmes will feel less concerned today about importation of enriched uranium and less concerned about not having reprocessing (facilities) themselves.

India and IAEA

Q: Are you happy with your interaction with the Indian nuclear programme and its policy postures? Or are there problems? For example, India (along with Argentina) doesn't participate in the IAEA's technical assistance programme as a recipient.

Blix: India takes part in a great deal of the exchange of experience and information that occurs in the Agency. India is also acting as host for quite a large number of Agency activities. There are no problems in this The Agency performs safeguards over some Indian installations--those which are submitted to safeguards. And we have no particular problems in that. As I said, the Agency's role is to perform a service in this regard. Other states may urge India to accept fullscope safeguards--safeguards over all its nuclear facilities. This is the foreign policy of many states. But the Agency is not taking a stand on this. If India says, 'yes, we would like to have safeguards on something', then the Agency is there to provide this service.

And it is clear that India is paying a price for not wishing to extend safeguards. But that is India's decision. The Agency as such is not having any discussion with India on these matters.

Q: On the question of a certain technological choice which is really related to the safeguards question ... we are functioning basically with the CANDU system and it has been developed indigenously and we are going into a 500 MW system soon. Is that the 'price' you are referring to, that you are basically restricted to one track or one technological option. And then fuel...

Blix: Yes. Any country that is not benefiting from, or for reasons it considers valid chooses not to make use of, the international market for the exchange of experience in a particular field ... if there is good technology available, it is a cost. It is not for me--it would be presumptuous of me--to discuss whether the cost is commensurate with the gain. Evidently you have decided in India that this is worth paying the price for. I can only, as a personal view, express admiration for the technological prowess and skill, the scientific skill that has been demonstrated in the Indian programme ... that will also be manifested in the inauguration of the test breeder in Madras.

Q: Yes, you referred to that in your statement to the IAEA general conference: it was in a very positive context.

Blix: Yes.

Q: The Superphenix and this (FBTR in Kalpakkam) were referred to.

Blix: Yes. I think it's our due to recognise the scientific and technological prowess that lies in this.

Food irradiation

Q: If I may briefly turn to another subject, food irradiation. Especially because India is a large agricultural producer and we have big losses in storage, problems with preservation and so on. Although we started the peaceful applications of nuclear energy very early--we were there almost at the start--official policy has not approved this use. And I believe that our Government is now favourably inclined to this, it is believed to be about to clear it. Do you have an overall assessment of this question? For a developing country it must be all the more important ... do you have a data base for food irradiation?

Blix: Yes. For years there has been experimentation. When I was in Bombay I saw the results ... how the irradiated tomatoes looked beautiful and how the non-irradiated looked rotten (laughter). Those were the first ones I saw; since then I have seen in many places how research is going on. And I think these experimental data are sufficient to demonstrate the validity and the wholesomeness of this procedure. And indeed the codes adopted by the FAO (Food and Agriculture Organisation) and the WHO (World Health Organisation) have given their approval of it. So I have no doubts in that. Now you have this as a start. On the other hand, you have the enormous losses in food that occur everywhere, but in particular in the developing countries which would need food the most.

The question is how do you apply this new experience that indicates a safe method of preserving food to the situation of developing countries? Well, that's the implementation on an industrial scale ... and that is a big difficulty. I think it will come, but it is not easy. The only place I have seen this was early this year in (a facility in) Japan, where they were irradiating, about 15,000 tonnes of potatoes each year. The potatoes of the past year could be used in the new year. And that kept the prices down because otherwise you get sprouting. I understand that in the Netherlands too they have done it on a fairly large scale. South Africa, I understand, has also succeeded in irradiation of foods of various kinds.

I think it is coming on a large scale. But when you have a developing country with villages that are fairly backward, one should not be too optimistic that you're going to save the grain in the village silo or something like that. I think it is more likely that at fixed points in huge cities, where food is brought in, maybe one could have irradiation to protect oneself against salmonella and lots of other things. Or at export points or import points. But here are very significant organisational and industrial problems to solve. We are not there yet, it will take a number of years, but I see a dynamic development in this field, yes.

Pakistan's nuclear venture

Q: Thank you. Just a couple of other questions. How do you see Pakistan's nuclear programme? I ask because of the high level of political concern in our region--both in India and Pakistan--of the interaction between the two programmes. And certainly in Indian official statements and in the media, we have a certain perception of a very risky process. Pakistan is seen to have a clandestine programme along with its safeguarded or open side. Do you have any information which is relevant to this?

Blix: No. As in the case of India, our work is to perform a service, namely to safeguard the installations that are submitted to us. We are not meddling, we are not an international espionage organisation to find out what a state is doing in areas not safeguarded. We have the technical function of running these safeguards in an efficient manner and we have no problems in performing the safeguards in Pakistan today ... what is submitted to our safeguards. Of course, with safeguards having the purpose of creating confidence, any installations which are not submitted to safeguards may well be peaceful but they do not have that extra evidence of peacefulness which comes from the safeguards verification. That applies both in Pakistan and India, but we have no knowledge about these installations and therefore we do not talk about this.

Impact of discrimination

Q: Finally, on the Third NPT Review Conference. Two types of views have been heard on the IAEA's role in this. On the one hand, the United States and the Soviet Union also took the position, that the IAEA was very much involved in it ... you have a responsibility to perform in relation to the NPT or global nuclear bargain. On the other hand, you had criticisms such as the one put forward by Dr. Raja Ramanna (Chairman of India's Atomic Energy Commission and leader of the Indian delegation to the IAEA's recent general conference) that neither the IAEA nor India, for example, is in anyway bound by the NPT, the decisions, the proceedings of the NPT review conferences. It seems to me that this is an uneasy relationship. You are there and yet the conflicts have an obvious impact on you. And since it is a very unequal thing as we see it--there's a discriminatory element--the IAEA also suffers from the impact of this. What is your view of these issues?

Blix: Well, the NPT requires of its members that they shall submit all their nuclear installations to safeguards. And the Board of Governors of this organisation (the IAEA) has adopted a model for these safeguards and we administer them and we conclude safeguards agreements with the NPT states. In response then to the clause about safeguards in the NPT ... that gives us business, it gives us work, in the same way as the Tlatelolco Treaty (the Treaty for the Prohibition of Nuclear Weapons in Latin America, signed in 1967) which I think you do not consider an unequal one--also specifies that its members shall submit all their nuclear installations to safeguards, and conclude agreements with us about safeguards. So in this sense, it is bound to be of interest within this organisation what the parties to the NPT want to do in the future.

But we are not the Secretariat of the NPT! That we are not, nor are we the Secretariat of the Tlatelolco Treaty. And therefore we do not have any reason to look at a number of the conclusions which the conference drew ... their conclusions which relate to the Agency, recommendations or otherwise, should be looked at here. But the (Review) Conference of the NPT does not decide anything for the Agency. It's our own policy-making organs that do that.

THE HINDU: Thank you, Dr. Blix.

Correspondent Notes Significance

New Delhi PATRIOT in English 16 Dec 85 p 5

[Text] Although Pakistan President Gen Zia-ul-Haq will, for reasons best known to him, not be present at Kalpakkam on 16 December, a top Pakistani scientist, Dr Munir Ahmed, will be there to witness India's first fast breeder reactor in operation. Leading scientists and nuclear specialists from France, the Soviet Union and other major industrial powers will also join the occasion. A Chinese nuclear scientist is expected at Kalpakkam too when Prime Minister Rajiv Gandhi dedicates the FBTR and MAPS-II to the nation.

December 16, 1985 is a day of great significance in this country's quest to harness the power of the atom: and not only because India can now be counted along with the top six nuclear nations of the world--all of them advanced industrial powers--for having commissioned a fast breeder test reactor with its own capability.

The occasion marks a triple thrust for India. The country is launched on the road to abundant and commercially viable nuclear power generation; there is a breakthrough of a special import for India in the realm of fast breeders; and, not the least significant, this country has been placed on the threshold of higher echelons of science and futuristic technologies.

What is the place of MAPS-II in this nuclear scenario? MAPS-II demonstrates clearly that the nuclear power programme of this country is reaching a stage of maturity. MAPS-I was a test case for India's nuclear scientists and engineers--a test of capability to design, construct, manufacture, commission and operate a nuclear power plant entirely by themselves. They have emerged from this test with flying colours, and the operations of MAPS-I, commissioned in July 1983, made India the first developing country of the world with such a capability. The commissioning of the second unit of the Madras Atomic Power Station has consolidated this achievement. Moreover, it advanced nuclear self-reliance a step further with a display of dynamism in this field of advanced technology. MAPS-II, it could aptly be said, gives the green signal for a sound launching of the programme for achieving 10,000 MWe of nuclear power generation by the year 2000.

The urgency of developing the country's electric power generation reinforces in the importance of MAPS-II, for the project also shows that Indian technology in this sphere is vibrant and developing. And, the back-up industrial support for its application and rapid project construction is being built up with meticulous care and dedication. Between RAPS-I and II and the reactors at MAPS, there has been no stagnation but constant technological advance. Each unit incorporates improvements over the other. For example, the end shields in MAPS-II are better in terms of materials used and the quality of construction. The levels of radiation in different areas of MAPS-I and II have been generally low in comparison with the Canadian-designed RAPS units, due to improvements in design and the quality control of components. The same applies to other functions and operations in the nuclear units that have come up, such as recovery of precious heavy water and the technology for upgrading the heavy water recovered from plants--specially important for RAPS.

Two other facets deserve to be noted: the capacity for quick absorption and application of higher technologies--foreign and self-developed--by India's nuclear establishment, and secondly, rapid rate of indigenisation. As for indigenisation and the capability to fabricate the main components inside the country, the level reached by MAPS-II is almost 90 per cent--a constant ascent from RAPS-I onwards. What now remains for import is only special materials and inputs and a few components. And as for the first facet, the most significant is the depth and the breadth of expertise attained by India's nuclear specialists, both scientists and engineers. Three generations of expertise have been added since the days of Homi Bhabha, the titan who laid the foundation of India's nuclear programme. This is shown in a striking way by the fact that at the time of initial criticality of MAPS-II, most of the start-up operations were in the hands of young nuclear technologists in their twenties and thirties.

The breakthrough achieved in the sphere of fast breeders marks the commencement of a second, and a higher phase of India's nuclear power strategy, opening a new long-term vista in the decades ahead. The FBTR went critical on 18 October, and its operations in these two months have been almost flawless--an event of world-wide import, giving unbounded self-confidence to India's nuclear specialists.

One of the biggest challenges to Indian scientists posed by the FBTR was creation and development of the fuel required by liquid metal-cooled fast breeders. The mixed carbide fuel, based on enriched plutonium 239 and natural uranium, prepared by Indian scientists is the first of its kind in the world. Hitherto, western countries have been using mixed oxide fuel based on enriched uranium. Besides replacing enriched uranium by plutonium, the Indian scientists found the carbide fuel to be better and more compatible with the sodium coolant used in the Indian fast breeder. According to Indian scientists, the mixed carbide fuel they have devised has several advantages over the uranium rich mixed oxide fuel. Among others, it has 5 to 7 times better thermal conductivity, 30 per cent higher heavy atom density, and above all, excellent compatibility with the sodium coolant as compared to the oxide fuel.

The FBTR has a great significance in India's nuclear plans as well as in the economies related to power generation. For, fast breeders not only generate power but do much more--continuously create or breed far more nuclear fuel than they consume. The FBTR itself will, in a few years, breed enough fuel not only to recharge itself, but also to provide a start-up charge for another full size fast breeder reactor.

The successful operations of the FBTR after attaining criticality on 18 October have paved the way for the next full-size 500 MW fast breeder reactor, a prototype of fast breeders of the next decades, work on which has already commenced at the Reactor Research Centre (RRC). The blue-print of design of this fast breeder is ready and construction activity on it will be undertaken shortly, using fully the experience of the FBTR's operations. Plutonium 239 for fuel of the initial charge of fast breeders will be available in sufficient quantity by reprocessing spent fuel from the chain of indigenously built pressurised heavy water nuclear reactors already commissioned or under construction. Thereafter, the fast breeders will be self-sustaining.

Together with BARC, the Reactor Research Centre comprises a base of higher research and development in the nuclear field and allied disciplines. The two work in unison and in that lies their exceptionally high capability over the entire range of study, research and application. Together with RRC, the BARC has developed the fuel for the FBTR, while RRC facilities and scientists have contributed to the BARC in launching DHRUVA, the world's largest research reactor, in August 1985, completely designed and built by scientists and engineers of these to institutions. When DHRUVA becomes fully operational, BARC will become one of the most extensive research reactor complexes in the world.

A third institution of higher science and research is now being set up in the country--the Centre for Advanced Technology--at Indore, largely as an out-growth of scientific manpower and attainments of BARC and RRC. The three institutions, it may be said, will be a trinity, taking Indian science and technology to still higher levels. The Centre's major thrust will be in the areas of lasers, accelerators and fusion related research and technology development. The Centre will not complement BARC and RRC, but create new lines of development of relevance to defence, electronics, computer aided developments in the higher technologies and for creating alternative sources of energy.

Comment by AEC Chairman

Madras THE HINDU in English 16 Dec 85 p 17

[Article by Dr Raja Ramanna: "Proven Viability of Nuclear Power"]

[Text] The dedication to the nation by the Prime Minister of the reactors at Kalpakkam, the Madras Atomic Power Station and the Fast Breeder Test Reactor, is a red letter day in the development of atomic energy in India. On the same day Mr. Rajiv Gandhi will rename the Reactor Research Centre as 'Indira Gandhi Centre for Atomic Research' in a fitting tribute to the previous Prime Minister. No document on the history of India in recent times can omit Mrs. Gandhi's name if it deals with the development of science and technology in the sub-continent. Mrs. Gandhi was fully aware of the power of science and the usefulness of atomic energy in the development of India's economic strength. She was even fully conversant with the many aspects of the complicated technological inputs that go to produce atomic power. It is, therefore, a pleasure for all scientists and engineers in the Department of Atomic Energy to express their gratitude to her by suggesting to the present Prime Minister that the Reactor Research Centre be named after her.

It has already been brought to the attention of the public that the development of the Fast Breeder Test Reactor ushers in the second phase of the atomic energy programme in the country. It has been the dream of all Indian planners to use seemingly useless and unwanted material for the production of power. The development of the new carbide fuel for the Fast Breeder Test Reactor, which promises a higher breeding ratio, brings closer the possibility of using the country's vast thorium resources. This entirely new development, specifically solved for Indian conditions, is significant for energy planners in the country for the next century. It is not that all the problems have been solved or that the economics have been fully established in the utilisation of thorium, but India has taken an important step towards the utilisation of this plentifully available raw material. This is a matter of great significance.

The dedication of the Madras Atomic Power Station by the Prime Minister also brings to memory the occasion when Mrs. Indira Gandhi formally inaugurated Unit-I of the station on July 23, 1983. Unit-I was the first power reactor to be entirely fabricated in India and naturally had certain teething problems. On the occasion of this dedication, the Indian public would be happy to know that Unit-I has worked exceedingly well with a high capacity factor and that Unit-II has begun to work satisfactorily from the very first day it was switched on.

It is also interesting to note that in November 1985 when the Tamil Nadu coast was being lashed by one of its most severe storms, power was flowing to the grid from the MAPS without interruption. This is indeed of tremendous significance in that it imparts great confidence to the people who have designed and built it, about the stability of such reactor systems.

The coming to criticality in recent months of 'Dhruva' at Trombay, the Fast Breeder Test Reactor and Madras Atomic Power Station Unit-II at Kalpakkam sweeps away several doubts about India's capacity to use nuclear energy for peaceful purposes. The research teams are of high quality and the engineers who designed and constructed the reactors are now fully trained to rise to all occasions especially now that a new indigenous technology has been introduced.

It is, of course, a pity that there are still people who use wrong or old information to insist that nuclear power is of no significance to this country. It is also sad that they will not even listen to technical explanations. On their part, the nuclear scientists are trying their best to explain to all concerned the benefits of atomic energy and the elaborate controls that are exercised to keep it safe. To date there has not been a single radiation induced fatality in the whole world due to utilisation of atomic energy for power generation.

India missed the first industrial revolution 200 years ago. Now it is moving with full momentum towards the second industrial revolution, and people must be well informed so that the Indian people do not miss it by wrong assumptions and are not misled by vested interests. The nuclear technologists have to be constantly on the watch that nothing is done to withhold developments for the future.

It is, therefore, a day of rejoicing that with the support of Jawaharlal Nehru, Indira Gandhi and the present Minister for Atomic Energy, Mr. Rajiv Gandhi, the country has been able to chalk out its programme to establish 10,000 MWe of nuclear power by the end of the century. This figure is small compared to what other countries are doing such as the United States (1,07,109 MWe), France (53,328 MWe), Soviet Union (1,01,612 MWe), and Japan (37,648 MWe) but that India is putting it up in spite of many constraints shows the viability of its development after independence. From a country which could not produce quality nuts and bolts it has become one which can produce the most sophisticated of items, such as those required for liquid metal cooled fast breeder reactors.

It is my pleasure to express my admiration for all those who took part in the construction of the Fast Breeder Test Reactor, especially the former Director, Mr. N. Srinivasan and the present Director, Mr. C. V. Sundaram.

New Directions of Research

Madras THE HINDU in English 16 Dec 85 pp 18, 22

[Article by C. V. Sundaram: "New Directions of Research on Fast Breeders"]

[Text] The commissioning of the Fast Breeder Test Reactor (FBTR) on October 18, 1985 marks the beginning of the second stage of India's three stage programme for nuclear energy. The FBTR is a sodium-cooled, plutonium-fuelled loop type reactor designed to produce 40 MW of thermal power and 13 MW of electrical power. Power generation, however, was not the main goal in building the FBTR. It is essentially an experimental reactor for testing fuels and materials for use in larger power reactors. The scientists have also gained valuable experience in reactor design, indigenous manufacture of components, sodium technology and fuel development in the process of constructing the FBTR.

A very important aspect of the FBTR project is that the construction of the reactor was essentially an indigenous effort. A bold decision was made to fabricate all the major components like the reactor vessel, fuel and reflector subassemblies, rotating plugs, control and drive mechanisms, sodium pumps, intermediate heat exchangers, steam generators, the special steam turbine, sodium piping, fueling machines, central data processing extract ten to fifteen times more energy per unit mass of fuel than that extracted in thermal reactors. The high fuel burn up combined with a hostile environment of intense fast neutron flux, elevated temperatures, steep temperature gradients and liquid sodium cause interesting and challenging materials problems for in-core LMFBR components.

Important data that have to be generated through irradiation testing in the FBTR pertain to swelling rates, creep rates, and evaluation of thermomechanical properties of candidate fuel and structural materials under fast neutron irradiation at high temperatures and high flux levels. In addition, studies will be made to understand the physical and chemical behaviour of the fuel and clad at high burn ups involving phenomena such as fuel cracking, fission gas release, plutonium and fission products redistribution, clad corrosion, fuel-clad mechanical interaction, and the effects of porosity and stoichiometry.

The fast neutron exposure obtained over the life of a commercial fast reactor fuel element is relatively high, and simulation of such exposure can be obtained only by irradiation of test samples for a period of over three years in the FBTR. The development of special subassemblies for inpile irradiation testing and measurements, the efficient execution of well planned irradiation experiments and the analysis of the obtained results will be the objectives of a purposeful and active research programme with the FBTR in the coming years.

Towards prototype FBR

With the successful commissioning and achievement of first criticality of the FBTR, the first phase of the breeder reactor programme at this Centre has reached a culmination, and a beginning has rightly been made on the design of a Prototype Fast Breeder Reactor (PFBR) with a capacity of 500 MWe. The setting up of such a commercial sized reactor by the year 2000 with full participation of Indian industry will provide the impetus for a series of such reactors to be built in the early decades of the next century.

The capacity of the PFBR has been arrived at after a careful consideration of steam turbine availability, grid capability, costs, the present status and future requirements of the breeder programme etc. The PFBR will be a 'pool' type LMFBR, unlike the FBTR which is a 'loop' type. In the pool design, the primary pumps and the intermediate heat exchangers (IHXs) are located inside the reactor vessel thereby eliminating the primary piping. It is planned to have four heat transport circuits, involving four primary pumps, eight IHXs, four secondary loops with pumps and 12 steam generator modules. The chain reaction will be controlled by 12 control rods.

There are many fascinating aspects and challenging tasks in the development of technology for a PFBR. The main technological challenge stems from the very large size of reactor components and different design features of some components when compared to those of an FBTR. The concept of the primary circuit housed in the main sodium tank, preferred on account of its inherent system, control room panels etc., within the country. The sodium handling and purification techniques for the FBTR have been developed entirely at the Research Reactor Centre.

The FBTR uses, for the first time in the world, a mixed carbide of uranium and plutonium as fuel for driving the reactor. This fuel was indigenously developed and manufactured at the Bhabha Atomic Research Centre.

Supporting R & D

For the success of any high technology venture, research and development support is crucial. Therefore, several laboratories were established in the Kalpakkam Centre to provide R & D support to the FBTR project and for the future development of fast breeder technology. Thus today there are well established laboratories dealing with reactor engineering, radiometallurgy, radiochemistry, fuel reprocessing, materials development, materials science, electronics and instrumentation and safety research.

Further, a design group which has considerable experience in nuclear steam supply system, reactor physics, sodium system and instrumentation has grown to maturity, ready to take up the challenge of the next phase of the nuclear power programme. Multi-disciplinary research involving all these groups is necessary for designing and constructing a larger fast breeder reactor that will provide power to the nation in a safe, reliable and economical manner.

The R & D groups have already contributed to the successful completion of the FBTR project. The design and fabrication of the fuel, selection and evaluation of structural materials, sodium purification and handling and testing of reactor components in sodium are examples of R & D support.

Utilisation of test reactor

The FBTR is at present being operated at low power in order to measure the reactor physics characteristics of the core which uses a new carbide fuel. The reactor physics measurements being made and also to be made later are expected to yield a wealth of information which would be used to develop the capability for fast reactor design studies in India.

The operation of the reactor also leads to an understanding of the behaviour of various sodium components, the transport of radioactive nuclides in the primary circuit, the dynamic behaviour of the plant as a whole, the behaviour of the failed fuel detection system and other instrumentations. The operation of the FBTR in conjunction with specific engineering experiments will lead to important information to be used for the establishment of a reliable design for future larger LMFBRs.

The operation of FBTR as an irradiation test bed assumes special significance in the context of the need to develop an advanced fast reactor fuel for effective breeding and rapid exploitation of India's nuclear resources. On account of the economics of the fast reactor fuel cycle it is necessary to safety, also requires studies of flow distribution within the main tank and component arrangements. While in the case of the FBTR, the design and manufacturing know-how were made available through a technical collaboration with the French Atomic Energy Commission and French industries, the emphasis now is to develop the large systems of the PFBR on our own, considering the confidence gained in the course of construction/commissioning of the FBTR.

Engineering development is thus necessary to finalise the design and to verify the performance of components in simulated reactor conditions over sizable periods of time. The latter requirement will call for manufacture and testing of the prototypes of critical components in sodium test facilities. The following describes the main areas of engineering development needed for the fast reactor programme.

Pool and component hydraulics: In the so called "pool concept" where the complete primary circuit is housed in the main sodium tank, "cold" sodium at 380°C contained in the outer region of the tank is circulated through the reactor core by means of submerged pumps. The hot sodium flows from the core at 530°C into the heat exchangers (also submerged in the sodium tank) where it gives away its heat to secondary sodium and discharges back into the pool. An inner vessel separates hot and cold sodium in the main tank. This arrangement requires a detailed experimental study of coolant flow distribution in the normal and off normal conditions of the plant.

Further it is important to ensure freedom from gas entrainment in sodium from its free liquid surface, and absence of vibrations of various submerged parts. All these studies can be carried out in water which simulates sodium pretty well, thanks to its comparable free flowing property and density. Other hydraulic studies based on similarity of fluid properties between water and sodium include flow distribution, measurement of fluid pressure losses and tube vibrations in the intermediate heat exchanger, steam generator, and fuel assemblies and study of model and full scale sodium pump.

Experimental stress analysis: Though the design of certain crucial components of reactor assembly such as inner vessel, grid plate supporting the fuel core and roof structure can be carried out following guidelines from established engineering codes, their service conditions, particularly high operating temperature, and their geometrics are such that it would be prudent to back up the design with experimental measurement of strains on scaled down models.

Component manufacture and testing: As the large mechanical components for the PFBR will be constructed for the first time in the country, difficulties and surprises during manufacture should be anticipated. However, to minimise these, it is planned to manufacture one prototype each of the critical components such as steam generator, control rod drive mechanism, sodium pump etc. followed by their testing in simulated reactor environment. Sodium test facilities are being planned to cater to sodium testing of components where simulation in water/air is not adequate.

Development work on sodium pump and steam generator have been already initiated.

Fabrication: Very large size nuclear components will have to be fabricated indigenously for the PFBR. For example, the reactor vessel, to be made of reactor grade austenitic steel, will have 15 m diameter, 13 m height, 20 mm thick cylindrical shell and 35 mm torispherical bottom. Fabrication technology will have to be developed and optimised to achieve the required tolerances and quality. Very high quality weld joints have to be made for various mechanical components. The development efforts will have to include mock up testing to assess the welding distortions. For some critical components, full scale mock up fabrication will have to be made. The precision machining and welding and fabrication to close tolerances of such large, complex geometry nuclear components will be undertaken for the first time in India.

Fuel development

A mixed oxide of uranium and plutonium containing 15-30 per cent plutonium is generally used as fuel in the current generation of fast breeder reactors. However, mixed carbides and nitrides are potentially superior because of their better physical properties such as thermal conductivity and density. A higher thermal conductivity makes it possible to extract more heat from a given length of a fuel column. A higher density of heavy metal atoms can lead to better breeding ratios. For the FBTR, a mixed carbide of uranium and plutonium was chosen as the fuel not only because of our interest in this potentially superior material but also because of better compatibility with clad and coolant when the plutonium content is high as required for a small fast reactor like the FBTR.

The FBTR fuel has, however, been designed on the basis of limited information available on the properties of a mixed carbide with high plutonium concentration. Often the scientists had to resort to theoretical analysis in the absence of experimental information. The post-irradiation studies on this fuel after it is burnt in the reactor will give the necessary data to improve its performance so that a burn-up of 5 atom per cent is realised.

A commercial fast breeder reactor can generate power at competitive prices only if the maximum possible energy is extracted from its fuel bundles. Thus the development of a reliable, high performance fuel is an important task in the programme to construct the PFBR. The fuel must be capable of high burn-up (greater than 10 atom per cent), and high breeding ratio. Initially, the fuel is designed on the basis of predicted physical and chemical properties of the burnt fuel which contains a host of fission products in various chemical and thermodynamic states. Some of these predictions can be validated through simulation experiments outside the reactor. Irradiation experiments followed by post irradiation studies in hot cells are necessary to arrive at an optimum design.

Such a fuel development task calls for multi-disciplinary research involving metallurgists, chemists, physicists and chemical engineers. If we continue in our efforts to develop the mixed carbide and, perhaps, mixed nitride fuel, we will be pioneers in the field of advanced LMFBR fuel development. Looking further into the future we also have a strong interest in developing thorium based fuels and this also is an exciting advanced area of work.

Hot cells fitted with very sophisticated equipment and provided with inert atmosphere for studying irradiated carbide fuel have already been set up.

Sodium chemistry & technology

Liquid sodium, used as the coolant in the fast breeder reactors, is compatible when in the pure state with the stainless steel structural materials. However, impurities such as oxygen and carbon, even at parts per million levels, can cause corrosion and mass transport. There is considerable incentive in minimising the corrosion allowance provided in the design of structural materials. For this, one must understand the mechanisms of these processes and also monitor impurities in reactor loops. Developing techniques for these is part of the on-going programme. Understanding activity transport in reactor loops and mitigating its effects in the maintenance of reactor components is another area which deserves attention. Leaks in the steam generators which can lead to sodium-water reactions can be detected quite easily using sensitive detectors under development.

The PFBR is much larger in size compared to the FBTR and, therefore, developments in sodium technology must take this into account. For example, the sodium inventory in the PFBR will be about 3,000 tonnes as against 90 tonnes in the FBTR. To keep this sodium pure, 'cold traps' with increased impurity trapping capacity have to be developed. To provide the high sodium flow required through the core, much bigger sodium pumps (6000 m_3/hr capacity) have to be designed, manufactured and tested. For pumping sodium in smaller loops and for measuring its flow, electromagnetic pumps and flow meters are required. Sodium being opaque does not permit the direct viewing of components immersed in it. Hence under-sodium viewing instruments will be developed for in-service inspection of components. A system based on pulse-echo technique is currently undergoing trials. The detection of the onset of boiling in overheated coolant channels is important from the point of view of safe operation of the reactor. Systems based on acoustic noise analysis technique are also under development for this purpose.

Fuel reprocessing

The fuel cycle is closed through fuel reprocessing which separates and purifies the plutonium produced in the fast breeder reactor for refabrication into fuel assemblies. Thus reprocessing occupies a crucial position in the fuel cycle as its efficiency is vital to both the system doubling time and fuel cycle cost. The reprocessing programme will undertake reprocessing of mixed carbide fuel irradiated in the reactor on an experimental basis which will in addition to recycling of plutonium to the reactor enable (1) qualification of equipment developed for radioactive operation (2) improved understanding of process chemistry related to the dissolution of plutonium rich carbide fuel, the solvent extraction of plutonium from plutonium rich nitric acid solution in presence of uranium, the fission products and to the radiolytic degradation of solvent, (3) gaining experience in handling materials high in alpha, beta and gamma radiations.

Reprocessing of fuel discharged from a 500 MW prototype fast power reactor involves scale up of operation, that is several folds larger in magnitude compared to the test reactor. The reprocessing programme will, therefore, focus its attention on engineering and system studies related to scale up of equipment and on design concepts that are essential for an economically viable safe industrial plant. This involves engineering studies related to: (1) development of continuous equipment almost in every unit operation to meet high capacity and critically safe geometry (2) remotely operated equipment for various operations and (3) on-line instruments.

A hot facility is being built as a part of the Kalpakkam Fuel Reprocessing Plant which will be operational during the next decade. This plant will also treat on an experimental basis fuel discharged from the prototype fast reactor as a prelude to large scale establishment of fuel reprocessing of FBR fuels.

Welding constitutes the most important fabrication procedure in the construction of fast reactors. The materials development activities for welding consumables are also therefore required. A systematic study of the effects of the welding process variables, choice of electrode/filler, pre and post-weld heat treatments on the macro and microstructures, mechanical properties and corrosion behaviour of weldments of both austenitic stainless steels and ferrite steels of interest have already been initiated.

It is known that the service environment can have considerable influence on the life of the reactor components particularly with respect to creep, fatigue and creep-fatigue interaction effects on component life. Hence facilities for creep, fatigue and corrosion testing of samples in flowing high temperature sodium of controlled purity are being planned.

Materials science studies

Radiation damage is one of the serious problems facing fast reactor structural materials. Recognising the fact that the damage arises essentially due to defects, the Materials Science Laboratory lays emphasis on the basic study of defects. Most of its research revolves around the characterisation, growth, kinetics and dynamics of defects and their effects on the various materials properties.

A survey of the areas of R&D in LMFBR technology being pursued at the Indira Gandhi Centre for Atomic Research has been presented above. The research and development activities have far reaching implications and are relevant to the emerging energy systems technologies of the 21st Century.

During the crucial formative years, the R&D programmes of the Centre have been guided by a Planning and Coordination Committee with Dr. R. Ramanna as the Chairman and Mr. N. Srinivasan as the Project Director. Special mention should also be made of the individual contributions of Mr. N. L. Char (Projects and Engineering Services), Mr. S. R. Paranjpe (Reactor Engineering and Design), Dr. G. Venkataraman (Physics, Instrumentation and Electronics), Dr. P. Rodriguez (Metallurgy), Dr. C. K. Mathews (Radiochemistry), Mr. G. R. Balasubramanian (Fuel Reprocessing) and Dr. D. V. Gopinath (Safety Research), and their colleagues.

Indigenous Components by BHEL

Madras THE HINDU in English 16 Dec 85 p 21

[Article by C. N. Garg]

[Text] The Hyderabad unit of Bharat Heavy Electricals Limited, situated at Ramachandrapuram, forms a vital link in the BHEL complex. Started with the manufacture of 12 MW and 60 MW turbosets for thermal power plants in 1963, BHEL, Hyderabad, soon diversified its activities by absorbing the latest technologies from world leaders to meet the new challenges and changing needs of the country.

With continuous efforts towards modernising its technology and taking up a new range of products, BHEL, Hyderabad, readily accepted the challenging task of manufacturing the block pile components for the Fast Breeder Test Reactor at Kalpakkam.

For the first time in the country, important components of a Breeder Test Reactor block pile, namely, reactor vessel with double envelope (RV with DE), large rotating plug (LRP), small rotating plug (SRP), thermal shields (TS), vessel and plug support (VPS) and liquid metal seals (LMS), have been manufactured at Hyderabad. The factory erection test of the reactor vessel, thermal shields, neutron shields and parts of grid plate was the special feature before despatch of the components to Kalpakkam. Due to the high operating temperatures and fast neutron exposures, the manufacturing specifications for the components are more stringent than the ASME Sec. III usually followed for thermal reactor components. They were successfully manufactured by BHEL under the guidance and strict surveillance of engineers from the Reactor Research Centre and third party inspectors.

Since sodium is involved as coolant and the materials are exposed to high neutron environment, special stainless steel of Gr. AISI 316 (17% Cr, 13% Ni & 2% Mo) was prescribed in the manufacture of these components. Together with high degree of skill in forming the materials to shape, it was also necessary to adopt special welding techniques in welding the components. High elongation values of 40 per cent were achieved on the welded specimens taken in the procedure qualifications and test coupons.

Also, since accurate alignments of the large rotating plug and small rotating plug are to be done over 700 odd positions on the grid plate for loading and unloading core sub-assemblies, special machining operations to achieve verticality, horizontality and eccentricity have been carried out on large machines like SK 125, W 250 and SR 3150. The large rotating plug and small rotating plug have been stacked with boronated graphite bricks and steel plates to serve as thermal and biological shielding. The dimensions of the large rotating plug are 3.4 metres dia, 2.5 metres height and about 40 tonnes weight. The tolerance on radius of the formed 10 mm shell was only 1.5 mm and this has been achieved. The most critical component of the reactor is the reactor vessel with a maximum dia of 3.2 metres, length of 8.5 metres and weight of 15 tonnes, the concentricity between the top and bottom flanges was to be within 1 mm and parallelism within 0.1 mm per one metre length. To achieve these values, accuracy was maintained on individual shells and sub-assemblies with strict stage inspections using dial indicators and optical alignment tools and the only accurate finish machining of the entire assembly was carried out. Important large dimensions were computed at 20°C to take care of changes due to temperature variations.

The assembly of the reactor vessel and other block pile components had to be done in clean conditions. At Hyderabad, a nuclear clean hall was specially erected. A passivation hall was also erected for chemical cleaning and passivating the components before being taken to the nuclear clean hall for further assembly.

At Hyderabad, a group of dedicated and committed engineers, technicians and artisans who fully understood the quality requirement of the programme was assigned this work.

The Director of the Reactor Research Centre, Kalpakkam, was satisfied with the quality of work done by BHEL. He remarked that "the industry rose to the occasion to fabricate components to unusually high standards."

Capability of BHEL

Madras THE HINDU in English 16 Dec 85 p 23

[Article by E. S. Chandrasekaran: "Capability To Meet Exacting Demands of Nuclear Components"]

[Text] The Madras Atomic Power Station at Kalpakkam is being dedicated to the nation today by the Prime Minister. The occasion also marks the rechristening of the Reactor Research Centre, as "Indira Gandhi Centre for Nuclear Research. India today is on the threshold of important achievements in nuclear power development. The long range plans of the Department of Atomic Energy (DAE) call for installation of 10,000 MWe nuclear power generating capacity by 2000 AD. The achievement of this objective calls for well-coordinated national efforts of a very high calibre and Bharat Heavy Electricals Limited is proud to be a partner in this great endeavour.

BHEL, Tiruchi, has been actively involved in the power and research programmes of the DAE for the last 15 years. It all started with the development of technology and manufacture of prototype channel covers and heavy water headers. This developmental work proved a success and BHEL, Tiruchi, was entrusted with the fabrication of bigger and sophisticated nuclear components which call for very high levels of dimensional accuracy and quality.

Equipment for MAPP

The first major order executed by BHEL, Tiruchi, was for the supply of reactor headers and steam generators for MAPP. The reactor headers (there are four of them in a 235 MWe unit) form the main interlink of the heavy water coolant circuit of the reactor. The dimensional accuracy, weld quality and non-destructive test requirements called for considerable developmental efforts and a prototype header had to be manufactured to prove the technology. The reactor headers have now become a part of BHEL, Tiruchi's regular product range.

Subsequently, it took up technology development for the manufacture of nuclear steam generators. BHEL developed the required skill and facilities and manufactured the steam generators for the MAPP-2 unit. There are eight steam generators in the unit. Heat produced in the reactor is carried by the heavy water to the steam generator. There, it is utilised to produce steam. Each steam generator consists of a steam drum, eleven U-tube heat exchangers, heavy water inlet and outlet headers for the heat exchangers and feed water header. Each heat exchanger contains 195 U-tubes of 12.6 mm diameter made of monel. The shell diameter is 356 mm. All the eight steam generators together supply 1,292 tonnes/hr of saturated steam at 40 atmosphere pressure with a maximum moisture content of 0.25 per cent.

Considerable amount of trial, training and testing was involved in developing the requisite manufacturing technology and expertise. A special clean room was constructed to ensure the quality of the tube assembly, especially the tube-to-tube sheet welding. Tube-sheet cladding with nickel and monel, optical alignment of the baffle bundle to ensure proper tube insertion, tube bend support system and tube-to-tube sheet welding were the main areas where development of technology called for a number of mock-up trials, training and qualification of personnel. The radiographic and ultrasonic examination of welds to special quality requirements and helium leak tests by vacuum also called for trials and training to establish the required accuracy of examination.

In addition to the above, BHEL, Tiruchi, also manufactured standby coolers and bleed condensers for MAPP, which form part of the primary coolant system circuit.

Fast breeder test reactor

For the FBTR project at Kalpakkam, BHEL, Tiruchi, was entrusted with the manufacture of intermediate heat exchangers, steam generators, sodium inlet/outlet pipes, straight pipes and special bends, reactor vessel shells and Y-bends.

The intermediate heat exchangers (IHX) (there are two of them in FBTR) form the link between primary and secondary liquid sodium. The total assembly consists of 888 stainless steel tubes of 14 mm outer dia. The steam generators produce steam by extracting the heat from the secondary sodium supplied by the intermediate heat exchangers. The steam generator is constructed in the form of hairpin bends with hexagonally placed Cr-Mo steel tubes of 33.7 mm outer diameter kept inside a pipe. The secondary sodium circulates around the tubes with the demineralised water passing through the tubes. Four steam generators together produce superheated steam at 125 bar pressure and 480°C for a rating of 50 MW thermal. The material used for shell and tubing is 2-1/4 Cr 1 Mo alloy steel stabilised by niobium.

The block pile pipings mainly consist of sodium inlet and outlet pipes with provisions for overflow pipe, sodium emergency pipe, siphon break pipe etc. These are made by stainless steel material which connect the block pile and the intermediate heat exchangers.

A high degree of skill was required for manufacturing the stainless steel components to meet the stringent quality requirements and also the stringent dimensional tolerances. BHEL, Tiruchi, carried out necessary pre-production trials, mock-ups, procedure and artisan qualifications and successfully established their capability for manufacturing stainless steel components and assembly to meet the requirements. Hydro-testing with strain gauge measurements and helium leak testing by vacuum method were successfully developed. A dust free clean room for assembly operations and special facilities for acid cleaning, hydro-testing with warm water and helium leak testing by vacuum were specially installed for FBTR component manufacture.

The Department of Atomic Energy placed an order for the engineering and manufacture of the main heavy water heat exchangers for the Dhruva Thermal Reactor (R-5) project. The heat exchangers (there are three of them) are used to transport heat from the reactor coolant (heavy water) to the process water. Each heat exchanger is rated for 34 MW thermal. Each heat exchanger has 8245 stainless steel tubes of 9.5 mm diameter. All the tubes are 'tube-to-tube' welded and expanded. It required considerable expertise and training to ensure proper expansion of these tubes where the tube inside diameter of 6.5 mm limited the design of expansion tools. All the joints including the double gasketed flanges were subjected to stringent helium leak tests. This called for very high accuracy in machining the gasket faces of tube sheet and channel flange.

Narora project

For the Narora Atomic Power Project, BHEL has been entrusted with the design and manufacture of steam generators and reactor headers. The design of these steam generators is very different from those used in earlier units. The work on manufacture is progressing and the first steam generator will be ready for despatch shortly. Each of the two 235 MWe units at NAPP has four steam generators. Each steam generator has an integral heat exchanger and drum, with an annular downcomer. In all respects. this design is on par with the present day design in developed countries. The selection of materials and design of components have been carefully done in order to increase the life of equipment. The pressure boundary is made of quenched and tempered steel of nuclear quality and tubes are made of incoloy. The tubes are supported by egg-crate type grids made of stabilised stainless steel. Each steam generator has 1830 'U' tubes of dia 16 mm. The heat exchanger portion of the shell is of dia 1960 mm and the drum portion is of dia 2600 mm and it has an overall length of 19.5 metres. The new design has called for the use of a different class of manufacturing technology altogether.

BHEL, geared up to this requirement by adding new facilities, extensive mock up trials and training. The fabrication of quenched and tempered steel, stainless steel, low alloy ferritic steel and inconel involved procedure and artisan qualification followed by testing to ensure that the stringent specifications are met. A numerically controlled deep hole drilling machine was procured and extensive trials with gun drills were made to establish the tube hole drilling to the required close tolerance on hole diameter, drift and pitch.

New welding procedures developed and successfully used include strip cladding (with inconel and stainless steel) and tube-to-tube sheet welding using pulsed TIG welding. The manufacture of lattice type grids involved machining to strict tolerance, assembly of grid flats on special fixture using resin bonded spacers and machining the assembly in that condition. All the internals like baffles and grids are assembled inside the steam generator, precisely controlling the alignment using optical methods in order to avoid tube insertion problems.

Local induction heat treatment had to be conducted at certain stages in the manufacturing process. The tube-to-tube sheet welding and tube expansion were independently qualified with helium leak testing by vacuum method. Helium leak test by vacuum for the complete steam generator assembly as well as hydraulic testing with hot demineralised water were some of the other areas of technology development. A large air-conditioned clean room of 2,700 sq. m. area has been constructed to ensure quality and cleanliness during assembly.

Manufacturing activities have already started on the steam generators for Kakrapara (2 x 235 MWe) project. Work has also been initiated for two more projects of 2 x 235 MWe capacity.

With the vast experience gained and the success achieved in the commissioning of nuclear power and research projects, the country is slated for achieving a tremendous growth in the years to come. The long term programme of the Department of Atomic Energy will be dominated by the installation of the standard 235 MWe power plants in the near future and 500 MWe power plants thereafter. BHEL, Tiruchi, is gearing up to augment its capacity for meeting the equipment requirements of the nuclear power development programme. An investment proposal for Rs 17.5 crores is under consideration. Detailed engineering studies have been carried out for the steam generators of 500 MWe units.

BHEL, Tiruchi, is thus poised to make significant contribution to the nuclear power programme of the country in the years to come.

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CSO: 5150/0053

DEFENSE INSTITUTE HEAD DISCUSSES NUCLEAR POLICY

Bombay THE TIMES OF INDIA in English 13 Dec 85 p 14

[Text] Noted nuclear analyst, Mr. K. Subrahmanyam, says India's decision on the nuclear weapon option should be based upon what others think of the utility of the doctrine of nuclear deterrence.

In a talk over All India Radio on Tuesday, he said while India did not subscribe to the doctrine, the country's security and national interest demanded that as long as others believed in the doctrine's effectiveness, India had no choice but to take a decision on that basis.

Mr. Subrahmanyam, director of New Delhi's Institute for Defence Studies and Analysis, said the country's nuclear options had to be viewed, in particular, against Pakistan's quest for nuclear weapons.

He also said that the objective of Pakistan's five-point proposal to India appeared to be to disarm India of the nuclear weapon option.

Speaking about Pakistan's quest for nuclear weapons, Mr. Subrahmanyam listed the various developments since January 1972, when Zulfikar Ali Bhutto put that country on the nuclear road, and said, "We have to conclude that Pakistan is pressing ahead with its nuclear weapons programme."

Clandestine purchases of nuclear weapons development-related equipment from the world over, the US waiver of the Symington amendment clause and speculations of a Pakistan-China collaboration for uranium enrichment capability, with no peaceful programme for its use, were given by him as the reasons for such a conclusion.

Commenting on Pakistan's five-point proposal, which India has rejected, Mr. Subrahmanyam said the rejection had been on firm grounds. Inspection was pointless, as Pakistan's programme was clandestine and India had not the capability for fool-proof verification.

Mr. Subrahmanyam referred to the proposed US second tranche of military-cum-security related economic aid to Pakistan and warned, "Pakistan is able, to get through the aid, to acquire many more aircraft delivery systems for its nuclear weapons and it may not need the US to guarantee its security."

He noted that for India, becoming a nuclear power would be economic, as it would just be translating civilian nuclear and space capability to the weapons programme.

Mr. Subrahmanyam also noted that the Indian sub-continent was surrounded by three major nuclear powers: China and the Soviet Union to the north and the United States in the Arabian Sea and the Indian Ocean. Israel and South Africa, two other littoral States of the Indian Ocean, were widely believed to be in possession of clandestine nuclear arsenals. France, too, which was modernising its submarine-borne missile force, could deploy the force in the Indian Ocean, he added.

Mr. Subrahmanyam said that in the new "Star Wars" technology, the southern oceans, especially the Indian Ocean, would play a significant role, as Soviet satellites in their Polar orbits came very low here.

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FRENCH AEC ADVISER TELLS POLICY ON TECHNOLOGY TRANSFER

Bombay THE TIMES OF INDIA in English 16 Dec 85 p 9

[Text] France is willing to transfer nuclear power technology to any Asian nation, including Pakistan, if it was approached, Mr. Georges Vendryes, adviser to the French atomic energy commission, said today.

He told reporters that Pakistan had not approached his country so far for transfer of technology, though it had approached some other European countries with bids for its nuclear power programme.

The power director of the commission said France was convinced that nuclear power was the only way of generating the energy needed to match the growing needs of every country. It was for this reason that France supplied South Korea with two 900 MW units of pressurised water reactors (PWRs), he added.

Mr. Vendryes said France was ready for discussions with the Indian government for transfer of any technology if the latter wanted to have collaboration with his country.

Asked about China's nuclear power programme, he said his country had agreed to help set up two power units of 900 MW each at a site about 50 km. north of Hong Kong. At least two-thirds of the power generated would be consumed by Hong Kong, he added.

PTI adds: Mr. Vendryes said France was very keen to renew its nuclear co-operation with India. But at the moment, France itself was very keenly watching the performance of the 13 MW fast breeder test reactor (based on the French Rhapsodie reactor) as it was using a new fuel, plutonium-uranium carbide. "This is a fuel which no one has tried so far in the world and we would like to see how India fares," he said.

He said France was delighted at the successful commissioning of the FBTR in Kalpakkam and thought "it was a beautiful achievement", considering very few countries went in for fast breeders.

Talking about France's achievement in erecting the world's biggest fast breeder reactor, the 1200 MW super phoenix near Leon city, he said, first criticality had been achieved in September and the scientists were proceeding cautiously in generating only 30 per cent of its power.

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INDIA

'SIGNIFICANT' URANIUM DEPOSITS FOUND IN MEGHALAYA

New Delhi PATRIOT in English 16 Dec 85 p 1

[Text] Shillong, Dec 15 (UNI)--Scientists of the Atomic Minerals Division (AMD) has located "significant" uranium concentrations in parts of west Khasi Hills in Meghalaya.

The scientists located the deposits while carrying out the exploration in the sedimentary rocks near Gomaghat, official documents available here said.

The document said scientists had recorded significant radioactivity in a number of outcrops of the Mahadeo formation, the focal point of search for uranium, along the Balat-Mania-Ranikor-Gomaghat-Nonghallam tract in the sandstones forming part of the lower Mahadeo formation.

The scientists, in course of their exploration, have so far recorded two radioactive zones in Gomaghat, each measuring more than 80 metre, the documents said.

Systematic channel sampling of 12 outcrop faces in the area revealed between 0.01 and nearly 0.1 per cent of uranium concentrates of thickness ranging from half a metre to about 2.55 metre.

This apart, the scientists delineated uraniferous greyish sandstone as discontinuous bands over 627 km tracts between Manai in the east and Ranikor in the west. They also encountered a 0.6 to one metre thick radioactive zone and found uranium deposits of 0.01 to two per cent, the document added.

The document said in Gomaghat the uranium appeared to be localised in the matrix and dimensions of the radioactive outcrops were comparatively larger.

In view of the encouraging results obtained in the Gomaghat area, the scientists felt that the possibility of locating "valuable uranium" deposits in Mahadeo formations appeared bright.

Earlier, the AMD scientists had struck uranium deposits in Aneak and uranium and thorium around Nenkhera in the Garo Hills.

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PAPER INTERVIEWS CHIEF OF SANE NUCLEAR COMMITTEE

Bombay THE TELEGRAPH in English 22 Dec 85 p 6

[Text] Should India embark on a nuclear weapons programme in response to the Pakistani bomb? Strong opposition to the widespread demand for an Indian bomb has come from the Committee for a Sane Nuclear Policy (Cosnup), one of India's leading anti-nuclear lobbies. Recently, Cosnup presented a memorandum to Prime Minister Rajiv Gandhi, calling for a nuclear weapons free South Asia and greater cooperation with Pakistan. Signatories to the memorandum included the former UN General Assembly president, Mrs Vijayalakshmi Pandit, retired Supreme Court judge V. R. Krishna Iyer, Lt Gen. Jagjit Singh Aurora (retd), writer and Rajya Sabha member Khushwant Singh, social scientist Rajni Kothari, civil libertarian V.M. Tarkunde, and champion of bonded labour Swami Agnivesh.

Prof. Dhirendra Sharma, convenor of Cosnup, was the chairman of the Centre for Studies of Science Policy, Jawaharlal Nehru University, before his controversial 1983 transfer to the School of Languages at the same university. He has taught at Harvard, Berkeley and several other foreign universities. Prof. Sharma spoke to THE TELEGRAPH on India's nuclear policy and related issues. Excerpts:

Q: Would India be justified in going in for a nuclear weapons programme now that Pakistan seems to be on the verge of acquiring a bomb?

A: No nation in the world, neither India nor Pakistan, or any other country, is justified in going in for such a programme because more than 50,000 nuclear warheads have already been stockpiled by the world's nations. This amounts to almost 17,000 million tonnes of TNT. This means that we have more than 3.5 tonnes of TNT per man, woman and child on this earth. And we can destroy the world 12 times over. We do not need any more atomic weapons on this planet!

India and Pakistan are facing severe problems of development. People have no food, no medicine, no education, no shelter. Any political leader of either country who speaks of or aspires to acquiring nuclear weapons is acting against the long-range interests of the people of this hemisphere. What we must remember is that the nuclear programme is irreversible. Once you start, you have to go on and on. Now, the super powers have reached a level where they can neither destroy nor use these weapons. So, they are pursuing the "Star Wars" prgramme. The question is, do we have the resources to waste on a weapon that is non-usable? Neither Pakistan nor India can ever use such weapons with impunity in this hemisphere. The radiation fallout will be so devastating that even if a single bomb is dropped on India, Pakistan too will be finished. Pakistan can never dare to even threaten India with a weapon of such devastating power.

You should also keep in mind that there are more Muslims in India than in Pakistan and that the Pakistanis have relatives here. Even Gen. Zia-ul Haq's relatives are here. So, it is not possible for any leader on either side to consider using the bomb.

Q: What about the generation of nuclear power for peaceful purposes?

A: The argument is, though nuclear weapons are bad, nuclear power can be used beneficially. In the early 1950s this is what the world wanted. Jawaharlal Nehru too was very enthusiastic about the idea and India's Atomic Energy Act (AEA) 1962, says that we will use nuclear energy purely for peaceful purposes, for the welfare of the people. But this is where the catch lies. We call it the "Siamese twins." 'Atoms for peace' and 'atoms for war' are Siamese twins which cannot be separated. Even Oppenheimer observed that any politician who says atomic energy is to be used only for peaceful purposes, is not telling the truth. This is because the process of generating power by atomic fission yields nuclear waste which is highly radio-active. It has no other use but to be re-processed and this results in weapons grade plutonium. So, when you go for a nuclear power programme, you acquire plutonium, (which can be) used for making weapons.

In response to the demands of World War II, the advanced countries went for the weapons programme directly. It was only later that they used atomic technology for power generation. But India and some other Third World countries want to go for a nuclear weapons programme via the power programme.

No Third World country has the capacity to produce nuclear power cheaply and safely. In the advanced countries, too, there has been a total breakdown of the atomic power programme. More than 150 power projects have been shelved. There are no new proposals coming up. Many states in the US have banned the setting up of nuclear plants. The US nuclear regulatory commission, has imposed such stringent restrictions that it is not economically viable to have atomic power.

Q: Prime Minister Rajiv Gandhi said recently that India will be going in for nuclear plants in a big way to meet the tremendous demand for power in the next century.

A: This is definitely very misleading. Any government which talks of peaceful work, may secretly be preparing for war. The government says that it wants to generate 10,000 MW (of power) by 2,000 AD. But this is not possible. We do not have the necessary infrastructure, or resources.

Q: They seem to be preparing for that.

A: They are preparing for weapons. And I mean that. The nuclear scientists need a cover. They are working overtime to produce missiles, rockets and to store up enough plutonium to prepare warheads. So that, by 1995, when we have stored up enough plutonium and achieved a delivery system, India can come out in a big way to call itself a super power. The credit for this will, of course, go to the Nehru family's patronage of nuclear science and technology.

Q: Where will the money come from?

A: In the name of the electricity programme. The government has already sanctioned more than Rs 15,000 crores for "peaceful atomic energy." I have worked out that for 10,000 MW of electricity, almost 2,000 tonnes of heavy water are required annually, and we would need about 50,000 trained personnel to run 44 atomic power stations in order to produce 10,000 MW at the present level of CANDU reactors of 230 MW capacity. We will need over 32,000 tonnes of heavy water to produce 10,000 MW. The cost of 1 kg heavy water is Rs 15,000.

It will be totally ruinous for us. What is shocking is that to this day there are no plans, no blueprints for such a project. They only seem to be planning for plutonium, reprocessing, laser technology and so forth. Thus, in the name of a nuclear power programme, the nuclear establishment is planning for something other than electricity. For it is easier to make a few nuclear warheads than to produce atomic power safely.

The Rs 15,000 crores sanctioned for the programme will double to Rs 30,000 crores by 1995. This is only the construction cost. The operational cost will be another Rs 20,000 crores. So, I estimate that Rs 50,000 crores will be required to produce 10,000 MW. A single megawatt of power will cost Rs 5 crores. This does not include what is called hidden cost.

There is another very important factor that should be considered. A hydel power station or a coal power station can be continued to be used for a long time if periodically improved or repaired (in case of damage). But an atomic power station has a life span of 25 to 30 years and it takes 10 to 15 years to construct at a cost of Rs 400-800 crores. Once it stops operating it cannot be dismantled. It remains dangerous for thousands of years.

Q: How dangerous is it to the environment?

A: Even when it is not operative, the plant may leak, releasing radiation into the air outside and underground water. Instead of squandering so much money on nuclear energy, the government of India should try to develop the renewable sources of energy available, such as the sun, wind and water. Only Rs 100 crores would be enough to produce 10,000 MW of power by exploiting these sources. We still have over 90,000 MW hydel electricity potential, from the Himalayas to the sea, that is simply wasting away. Atomic energy, however, is exhaustible. We only have uranium sufficient to generate 15,000 MW at the most.

Q: How do you view the present nuclear policy?

A: It seems that up to June this year the government had been constantly building up pressure to go for the weapons programme. It was being said that Pakistan had already exploded a nuclear device in China or was about to do it. At that time, the government was advised by the pro-bomb lobby that they should take a secret decision on the matter. In fact, even the Prime Minister in an interview that appeared in LE MONDE on June 4, said the decision would be secret. Earlier too he had said the same thing to Indian journalists.

However, the COSNUP protested against this. I also wrote to newspapers and to the Prime Minister that any secret decision to make a bomb would violate the AEA of 1962.

Q: Did Mrs Gandhi take a secret decision about the 1974 Pokharan explosion?

A: Not quite. She was wise enough to call it a "peaceful, scientific experiment." She did not violate the Act. Now here we have the director of the Institute of Studies and Analyses, Dr K. Subrahmanyam, and the pro-bomb lobby favouring a secret decision on the bomb.

Q: Do you think that funds are being diverted from the power programme to the weapons programme right now?

A: That's a very ticklish issue. We have no way of knowing. What is promising is that the Prime Minister, under pressure, has changed his stand. He said that when the government decided about the bomb, whatever the decision, "the people will be informed."

Mr Gandhi has recently made two or three very important remarks. One, he said that the government did not feel the need to make a bomb. Two, he said that if ever it did so, the people of India would be informed. It is a hopeful sign that the Prime Minister has committed himself and the government to the stand that the bomb will not be made secretly. In Japan, Mr Rajiv Gandhi declared unequivocably that even if Pakistan made the bomb India would not. And here we can congratulate the Prime Minister.

Q: But you really don't know what is going on.

A: Nobody knows, not even members of Parliament can get full information and there is no accountability. Crores of rupees will simply be utilised secretly. But the point is that the decision will be told to the people of India, though, admittedly, the programme still remains a secret. In India if one opposes the nuclear power programme, one is dismissed as a CIA agent.

Q: Do you think it is time that the AEA 1962, which ensures the nuclear establishment complete secrecy, was revoked?

A: Yes. The government should appoint a non-governmental interdisciplinary commission of enquiry with the powers to reassess nuclear fission technology, its cost, its environmental impact, and then reassess the nuclear programme in relation to the energy requirements of the country.

The commission should have the power to look into the performance of the atomic energy establishment and also examine the AEA in the light of new findings. I would say that the Act is outdated. A modern state cannot allow a handful or even one man--the chairman of the Atomic Energy Commission (AEC),--total power to do or undo whatever fits or suits his whims or design.

To this day, the AEC has not come under the purview of the legal provisions which govern other scientific establishments in the country. Thus, the Act should be scrapped. Actually, one of the main reasons that the programme is secret is that as soon as you decide to make a bomb, all international cooperation stops. In India's case this happened after the Pokharan explosion.

Q: Now France has resumed cooperation...

A: France is following an independent policy, an arrogant and jingoistic one. Ignoring the protests of the South Pacific islands, Australia and New Zealand, and in violation of international treaties and sensibilities, it has been exploding nuclear devices in that region just to prove that it is a powerful nation. This type of arrogance is primitive. Now India too is in the same game. For the sake of self-glorification the government wants to show that we too can make big bombs, big weapons. However, the Prime Minister does seem open-minded, and in this there is some hope.

Q: Who are the policymakers in India?

A: Those who benefit from the programme. The ruling family, certain powerful industrial houses that get the major contracts from the atomic programme, and a small group of scientists. There is a kind of alliance, a closed network of a few top industrialists.

Q: Such as?

A: If you want me to name them--the Tatas, Larsen and Toubro, and about 25 other top companies involved in the atomic power programme. Dr Homi Bhabha was the chairman of the AEC from its founding in 1962 till he died in 1966. He was J.R.D. Tata's nephew. Mr Tata has been a full-time member of the AEC since 1962, though during the Janata rule he was out of it. Here is a man who knows nothing about atomic energy but is a full-time member of the AEC. When I wanted to interview him during the course of my research, he wrote back saying that he had done nothing but support Homi Bhabha. Interestingly, 60 per cent of the contracts of the AEC normally go to the house of Tatas. So, the total decision making process rested with one man who founded the atomic energy programme and provided contractual benefits to his uncle's companies.

The third party which has benefitted directly is the ruling party. The AEA says that the AEC chairman is directly responsible only to the Prime Minister. And Nehru agreed to all of Bhabha's suggestions. So you had Nehru, Bhabha and Tata working together. Those who get AEC contracts in secret have to give no accounts.

But there are overt linkages. The Nehru Centre in Bombay, for instance, gets funds from the contractors of the AEC. Dr Raja Ramanna is the general secretary of the Centre. Dr Sethna, former chairman of the AEC, is directly involved in running the Centre. I am not saying that the Centre is not doing useful work. But look at the linkages.

Q: What do you think of India's policy vis-a-vis the Pakistani nuclear programme?

A: In the past India's policy was ambivalent. We did not want to say clearly what we intended to do. Intentionally, the government was maintaining a confused policy. They were not confused among themselves, but they wanted to create the confusion. It suited the rulers who want to stay in power but have not achieved much on the home front. It suited our scientists who have not done anything really creative. However, Rajiv Gandhi has recently cleared the confusion.

Q: Can there be anything like a sane nuclear policy?

A: Some people believe that there can be no sane nuclear policy. But science is always a growing process. There are innovations, new discoveries and technological problems can be solved by new applications. And since atomic fission technology is still new, there is hope that in time some solution will be found to the problems it poses, of disposal of waste and environmental damage, etc. Nuclear physics was there even before some countries decided to go for atomic weapons.

We could apply atomic technology in medical research. As much as 50 years ago this was being done. But let the problems be solved before we decide to go for the atomic power programme in a big way. I think India should follow the example of those countries which are called threshold nations--Canada, Australia, Sweden, Germany, Japan. All these countries are technologically capable of going in for nuclear weapons. But they are not doing so. And they all have a very high standard of living. If we can eradicate poverty, see to the problem of education, ensure that our hospitals are well-manned, and so forth, then we will have delivered the goods. This would be a more scientific approach than storing up nuclear weapons which can be neither used nor dismantled.

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'CONGRESSIONAL SOURCE' CITED ON PAKISTAN BOMB CLAIM

Bombay THE TIMES OF INDIA in English 23 Dec 85 p 1

[Text] WASHINGTON, Dec. 22. The CIA has said that China may have tested a nuclear bomb for Pakistan, according to a reliable Congressional source.

At secret meetings specially held for the house foreign affairs committee, the CIA admitted that seismic shocks produced in China's Lop Nor desert area in May 1983 were from a nuclear explosion, the source said. However, it said it had no means of knowing whether China tested the nuclear device on behalf of Pakistan or performed one of its own experiments.

The CIA's admission gives the lie to earlier statements by American and Scandinavian experts that the seismic shocks had come from an earthquake.

According to the intelligence agency, the nuclear explosions could have taken place either on May 13 or on May 15. These dates are important, as they could establish the complicity of Pakistan. It had been reported, presumably first by Soviet intelligence sources, that on May 15, 1983, Pakistan's foreign minister, Mr. Yaqub Khan, was present at the test site to watch the explosion. This reinforced the speculation that the Chinese were testing the bomb for Pakistan.

The Pakistan government tried to allay these doubts by stating that Mr. Khan was in Beijing, China's capital, on May 15 and not in the Chinese desert. However, nuclear test experts here counter this argument by stating that the actual test might have taken place on May 13 and the seismic reaction on May 15 could have been the aftershock. And on May 13, Mr. Khan and a number of Pakistan's nuclear experts might have been at the test site.

U.S. INQUIRY

In a determined search for the truth, a group of Congressmen pushed the matter further by asking the United States air force to provide all its secret surveillance data on the May 1983 test. The air force monitoring system in this field is considered the most reliable, but it pleaded that in the case of the Chinese test it had not received the human intelligence data from the CIA. Normally, the technical data collected by the air force and the human intelligence information gathered by the CIA are collated to reach a final and reliable conclusion.

The question that arises is: Can Pakistan be satisfied with a nuclear weapon that it has not tried itself? One answer is that the atom bomb dropped on Hiroshima had not been tested at all. Besides, every atomic weapon in a country's armoury is not tested. Only the design is tested and every bomb is made in accordance with it.

Through the Chinese test in 1983, Pakistan may have acquired nuclear weapons capability without losing American military aid. The assistance might have been cut off if it had conducted the test on its own soil.

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CPI WARNS GOVERNMENT AGAINST NUCLEAR BOMB

Calcutta THE TELEGRAPH in English 25 Dec 85 p 4

[Excerpt] New Delhi, Dec. 24: The CPI today urged the government not to get drawn into a nuclear arms race in the subcontinent but instead to concentrate on improving Indo-Pak relations in the direction of peace, friendship and cooperation.

In a lengthy political resolution at the end of its three-day national council meeting on the economic and political situation and foreign policy of the country, the party spoke strongly against the prospects of India going nuclear. It is the first political party to come out unequivocally against the possibility. However, the CPI general secretary, Mr Rajeswara Rao, refused to answer queries about the party's position on India's nuclear options if Pakistan acquired a bomb.

The resolution under the heading "International Situation," expressed concern at the US-backed efforts of Pakistan to get a nuclear weapon. It said: "instead of getting dragged into a nuclear arms race with Pakistan, India should stand firmly by its policy of opposing all nuclear arms proliferation, both horizontally and vertically. Any attempt by India to produce nuclear weapons will not act as a deterrent to Pakistan or bring additional security to India."

On the other hand, a nuclear India "will only aggravate tension and create apprehensions in the minds of neighbouring countries. Such a development will enable the imperialists to realise their ugly designs in the region," it said.

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CSO: 5150/0058

INDIA

EDITORIAL WARNS SDI COULD LEAD TO NUCLEAR WAR

Bombay THE TIMES OF INDIA in English 27 Dec 85 p 8

[Editorial: "Fallacies of SDI"]

[Text] The Office of Technology Assessment, which is closely connected to the U.S. Congress, has come out with a report on the dangers of the SDI programme which has won the grudging admiration of SDI's supporters. They have praised the report for raising "the level of national debate." But the issue is no mere debating matter. Once the SDI is launched, the nuclear arms race will have acquired a different qualitative dimension. Everything must be done to persuade the American government to give up this programme the purpose of which, as the report points out, is not to protect people but to protect missile silos. Thus, even if the SDI were 99 per cent effective (which is quite impossible) the Soviets can, by targeting most of their missile force on cities guarantee (because of the one per cent "leakage") the destruction of America's 90 largest cities. Defence of the U.S. population, then, does not in the words of the report, "appear to be a goal of the SDI programme."

And what are its likely consequences? One effect would be to make nuclear war more thinkable. If both the U.S. and the USSR have similar limited defences, then there is an incentive for either side to strike first because the "ragged response" of the other would not be so damaging. In fact, the report clearly points out that the defence systems themselves are vulnerable to a pre-emptive attack, giving an "advantage" to the side that strikes first. The overall effect, therefore, is to tighten the Soviet and U.S. fingers on the nuclear trigger. Then "the technological uncertainties of missile defence may lead to strategic uncertainty--with defence there will be more possible outcomes but fewer certain ones, of a nuclear war." The supporters of the SDI are well aware of these criticisms and are trying to convince the American public and Congress that they can establish a "workable defence" and that deterrence will be enhanced at every level. But to make such a case, SDI experts have to take into account "rational Soviet military policy", i.e. anticipate and prepare for "rational" responses by the enemy. Clearly all this has little to do with strategic defence against anything the enemy may plan; it has much more to do with nuclear war fighting. The SDI is exposed for what it really is, not an instrument of passive defense but of dangerous offence. If a large part of the American public has, nevertheless, bought Mr. Reagan's rhetoric about space defence and the "peace shield", this is partly because the insecurities bred by the escalating nuclear arms race have made them psychologically receptive to any programme that smacks of defence and safety against the unthinkable character of the nuclear threat that seems to loom overhead.

/13046
CSO: 5150/0057

INDIA

BRIEFS

FAST BREEDER REACTOR--New Delhi, December 11 (PTI and UNI)--India is engaged in designing and constructing a prototype fast breeder reactor which will be completed by the year 2000, the Lok Sabha was informed today. The minister of state for science and technology, Mr. Shivaraj Patil, told Mr. B. V. Desai and Mr. M. V. Chandrasekhara Murthy in a written reply the 500 MWE reactor matched coal-fired thermal power stations. [Excerpt] [Bombay THE TIMES OF INDIA in English 12 Dec 85 p 12] /13046

URANIUM MINING PLANS--Jamshedpur, Dec. 23: Uranium Corporation of India Limited (UCIL), Jaduguda, is planning to increase its production capacity by opening two more mines and resuming work in Bhatin mine that has been kept closed for quite some time. The new mines at Naroapara and Ruramdih are in Singbhum district. According to a UCIL spokesman, the expansion programme will entail a capital outlay of Rs 186 crores inclusive of a 3000-tonnes capacity new ore-dressing plant. The UCIL is taking measures to effectively contain radioactivity in its mines to prevent the people living in the vicinity of the plant from getting exposed to radioactivity. [Text] [Calcutta THE TELEGRAPH in English 24 Dec 85 p 10] /13046

CSO: 5150/0056

PAKISTAN TO JOIN EUROPEAN NUCLEAR RESEARCH CENTER

Karachi DAWN in English 7 Jan 86 p 8

[Text] Dr. Abdus Salam, Nobel-laureate, said here on Monday that Pakistan has decided to apply for the membership of the prestigious Centre for European Nuclear Research (CERN).

Quoting Dr. Mahbubul Haq, Federal Finance and Planning Minister, as saying that the Ministry of Science and Technology had been asked to take steps to join the CERN, he said the membership of the organisation, which verified his theory of particles, which won him the Nobel prize in Physics in 1979, will have a great symbolic value. Fourteen European countries are members of this body and recently, Turkey, Jordan and Egypt applied for its membership.

The CERN, with its headquarters in Geneva, has an annual budget of a quarter billion dollars with a laboratory worth half a billion dollars set up in 1958 and the biggest anywhere in the world.

Dr. Salam, who is a member of the Science Policy of CERN, said that Turkey, Jordan and Egypt have applied for the membership on his urging that technology cannot survive without high-level scientific base.

This organisation, he said, conducted a course in Sri Lanka last year and carried its equipment all through and this year another course is being conducted in Beijing. The Organisation also supplied one million dollars worth of equipment to the International Centre for Theoretical Physics at Trieste which Dr. Salam is heading.

The Third World Academy of Sciences of which he is president, has offered 10,000 dollar scholarship for research work to scientists within their countries.

The amount of scholarship will be $10,000 a year for a period of four years.

He said not a single application has so far been received from any Pakistani scientist.

The Academy, he said, will also announce annual prize for distinguished scientists for their work.

Dr. Salam said that the Third World Academy of Sciences was provided a $1.5m by the Italian Government, $0.5m by Canada, and Kuwait has agreed to pay for the cost of all publications.

The Academy has four members from Pakistan including himself. The other three are: Dr Salimuzzaman Siddiqui, Dr Akhtar of South ampton University, and Dr Ataur Rahman of Karachi University.

Dr. Salam laid emphasis on basic sciences and said it is lacking to some extent in UK also and leading scientists including himself have contributed funds for a full-page ad in London Times to be published on Jan 13 appealing to the governments to provide fair percentage of their GNP.

Dr. Abdus Salam said, universities in Pakistan are "dead" and the amount of funds is not increasing for science and technology.

Prof Salam, who arrived in Karachi on Sunday on a two-day visit on his way to a number of South and Far Eastern countries on a lecture tour, said, the scheme will be run by two Pakistanis, Dr. M. Shafi and Baqi Beg, who are based abroad.

He was happy to know that during his current visit NIAM-78, a new cotton variety, has provided the country additional income of 30 million dollars in the Punjab in one year alone.

NIAB-78 variety was produced at the PAEC's Nuclear Institute of Agriculture and Biology.

/12828
CSO: 5100/4732

PAKISTAN

PANEL SUPPORTS PAKISTAN BECOMING ATOMIC POWER

Lahore NAWA-I-WAQT in Urdu 15 Nov 85 Magazine pp 2-3, 20

[Panel discussion organized by NAWA-I-WAQT, moderated by Irshad Ahmad Arif]

[Text] Members of the panel are:

Air Marshall (Ret) Zafar Chaudhary, former head of the Pakistan Air Force

Mohammad Hanif Ramay, leader of Pakistan Musawat Party

S.M. Zafar, secretary of Pakistan Muslim League

Dr Parvez Hasan

Maj Gen Mumtaz Ali (Ret)

Sayed Fazal Hyder

Professor Hasan Askari

The moderator was Mr Irshad Ahmad Arif.

Moderator: I welcome you all to a discussion. Our topic for today is Pakistan's nuclear program. There is a general outcry in the world that Pakistan is building a nuclear bomb and sabotaging the peace efforts in the region. We shall limit our discussion to two points: 1) Have we the capacity to build a nuclear bomb and, 2) Can we afford it? Suppose we acquire the capacity to build such a bomb, how are we to cope with the other issues that are sure to accompany it? Above all, is it essential to become a nuclear atomic power to live in peace and security? First of all, I invite Air Marshall Zafar Chaudhary to give us his views on the matter.

Zafar Chaudhary: First of all, I must make it clear that I do not know whether Pakistan is engaged in building nuclear weapons or not. All I know is that the world news media accuse us of being engaged in building a nuclear bomb, while our President says most emphatically that we have neither the capacity nor the desire to build nuclear weapons, our nuclear program being limited to the generation of power for peaceful purposes. India has declared that it has no nuclear bomb, but if Pakistan builds one it will build one also. Now the question arises: Why should Pakistan want to build nuclear weapons? It is true that Pakistani scientists have the ability to build a nuclear bomb, and may have to do so as a deterrent against India who has, as some believe, already built one. Now the question arises: Will Pakistan's nuclear weapons serve as deterrents against India? It is a fact that India is stronger than Pakistan militarily, industrially and economically. Its army is much larger than that of Pakistan. It can harm Pakistan and can even grab some of our territory. Even if India has nuclear weapons, it will never have to use them. Suppose India were to attack a part of our country. It is strong enough to defeat us without the help of nuclear weapons. Suppose we were to use a nuclear bomb in self-defense. India would use atomic weapons in greater numbers, and consequently Pakistan would suffer more. We know, and so does India, that nuclear warfare will harm us more. When we are attacked with conventional weapons, we have to answer with conventional weapons. Under these circumstances, how can a nuclear bomb be a deterrent? Again, our priorities are political stability and economic progress. We should spend money on giving our people the basic needs of life, i.e., food, shelter and education. We should not spend money on nuclear weapons. That will lead only to our own destruction.

If we build an atomic bomb in secret, how long can we keep it secret? When the secret it out, we shall lose our credibility, since our president has declared that we have no intention of building a nuclear bomb. Nobody after that will believe us and no country will help us. We buy arms from developed countries. When they find us untrustworthy they will stop selling us weapons and we shall be left quite defenseless. Many countries in the world (e.g., Japan, Canada and Germany) have the capacity to build nuclear weapons, but do not do so. They think such weapons are useless for self-defense. Some of them have made pacts with particular superpowers to give them guarantees that they would be saved in the case of a nuclear attack by an adversary. We may call this a diplomatic defense against a nuclear attack. They try not to get involved in any regional quarrels. We, too, can probably get such a warranty from a superpower. The best method, of course, is to be on good terms with our neighbors and eliminate the chances of war. War never solves, but only increases problems.

There are many other countries in the world that have strong neighbors. Do they defend themselves with the help of nuclear bombs? They do so with the help of good-will missions. We, too, should do that and try to eliminate the basic causes of our quarrels with our neighbor.

S.M. Zafar: It is a fact that Pakistan is trying to harness nuclear power, but nobody believes that we shall use this power only for peaceful purposes, that we shall never make atomic weapons. Other nations are suspicious of us and they have a reason for their suspicions. Gaining nuclear capacity is a long and arduous task, but once the technique has been mastered it is comparatively easy to build a nuclear bomb. In a few words, we can say that this capacity means the know-how to separate the lighter, finer and purer kinds of uranium from its heavier kinds. Once this pure uranium has been attained, it is used in a reprocessing plant to make electricity. This same uranium, (after a little more research and study) when used in a certain proportion and joined with a switch to split the atoms, results in a nuclear bomb. A country is said to have a nuclear bomb when it has conducted a nuclear explosion. No country can produce a nuclear explosion without first mastering nuclear technology.

A country is said to have become a nuclear power when it conducts a nuclear explosion. If a country learns the know-how to purify uranium before making an explosion, it generally keeps the fact a secret. This fact comes to light only when a country either conducts an explosion or allows international teams to inspect its installations. At this moment Pakistan has the following options:

1) It should tell the international agencies all that it has achieved so far and stop any more work on nuclear technology. In that event, even France will give Pakistan the reprocessing plant it has recently refused to give.

2) Pakistan should continue to work in silence, until it has mastered the technique of refining uranium, and stop short of building a nuclear bomb. (This is, probably, the policy our government is following at the moment.)

3) It should conduct an explosion, if possible.

I find the first option quite unthinkable. The next decade is going to be the decade of nuclear technology. The countries that want to resolve their energy crisis will have to adopt nuclear technology.

Ayub Khan's cabinet started the task of setting up an Atomic Energy Commission in Pakistan in 1965, with I.H. Usmani as its chief. This work progressed in the days of Mr Zulfiqar Ali Bhutto. America tried to stop the work by sending Mr Henry Kissinger to Pakistan. The present government, too, is being pressured in the same way. It is good to know that all the changing governments have had the same attitude toward the atomic energy program. Not only that, but even the new generation of Pakistani scientists, who were having an easy life in developed countries, have come back to work in their own homeland. As a result of these people's hard work, now Pakistan's name is at the top of the list of the countries that are on the verge of becoming nuclear powers. We should not stop our nuclear program at this juncture, for it will mean the waste of all that time, money and energy that have already been spent on it. Another consideration that has become useless now is that other nations will not believe us when we say that we do not want to build a nuclear bomb. Nobody believes us now and nobody ever will. Why? Because there is so little distance between the capacity for producing nuclear energy and building a nuclear bomb that no country that does one can refrain from doing the other.

Again it has been a tradition of the "nuclear club" to try to keep down the number of its members. They go on opposing a country aspiring to become nuclear until it becomes a member. Then they accept it. India is opposing us partly because it has become a member of the nuclear club and does not want us to do so and partly because opposing Pakistan in everything has become India's historical role. All nuclear powers are trying to place hurdles in our way. Israel may try to harm our power plants. The question is: Is it enough to tell Israel that if it tries to harm our power plants we would fight back? This threat has served its purpose but is now outworn. I think Pakistan should adopt the third option now. We have learned to purify uranium. Now we should, with the help of God, produce an explosion. It will stop all danger of war in this region just as the nuclear strength of the two superpowers has eliminated the danger of war between them since World War II.

General Mumtaz Ali: Let us consider our position at this moment. We are at a crossroads. We shall have to play our cards with great care. Why is India building up such military strength? Where is the danger it wants to counter. It has the Himalayas in the north, the sea in the south, on the east and west it has small countries like Pakistan and Bangladesh. For what purpose is India making such big military preparations? I think curbing nuclear proliferation is essential for peace. I agree with Zafar Chaundhary there, but I think a nuclear bomb will be a good deterrent. Hence I think, since India has become a nuclear power, Pakistan should become one also. Just as the United States and the USSR do not dare to attack each other, because both are nuclear powers, so Pakistan and India will stop threatening each other when they both become nuclear powers. Our nuclear strength should be at least one tenth of India's. We shall never use our nuclear weapons against India nor they against us. Like the two superpowers, we shall keep atomic weapons to prevent war.

I know we have the know-how to make nuclear weapons. We have very able scientists. Now we come to the second question: Can we afford an atomic bomb? This is in fact two questions: 1) How much will we have to pay for it? 2) What will the delivery system be? If India is willing to make a no-war pact with us, well and good. If not, we should build nuclear weapons and use them as a deterrent against an attack from India.

Sayed Fazal Hyder: Our army has always kept its activities secret from the people, not only during the last 8 years, but even before that. We have never known the whys or wherefores of anything. We have had to learn all about our future, defense and form of government from the foreign media. I think, in the modern age, nuclear proliferation is not the problem. The question is how any power is going to use its nuclear capability.

As long as the United States had not exploded the atomic bomb it was an invincible power, but owing to the spread of nuclear technology the United States and the USSR can annihilate each other within a few hours. For the question of whether Pakistan should build the bomb or not, let me recount what happened last year. A team had come here from India. I talked to them about the defense conference they had at Delhi which was attended by civilians as well as by the military (unlike Pakistan where civilians are kept away from all discussion of defense). When I was in America, I watched a film about the progress different countries are making. It showed all the work being done at Kahuta. It was said in that film that since Pakistan is on the verge of becoming a nuclear power, Pakistanis should have the honesty to own up to it; they should stop denying it. But I was telling you about the convention that I attended in India. Somebody asked there if the next war between India and Pakistan would be another 17-day luxury or something more serious. Someone replied that the next war between India and Pakistan would come to its logical conclusion. I asked them to explain the logical conclusion for Pakistan. I asked them if they wanted to destroy our army, annihilate our population or weaken our country by partition. They did not answer any of my questions. I think the basic cause of the bad blood between the two countries is that Liaqat Ali with his challenging "fist" and Henru with his challenging tongue thought only of their own political power. They did not try to base the mutual relations of the two countries on good-will and peace.

However, before making a nuclear bomb we should ask ourselves: Have we become self-supporting in conventional weapons? If we cannot even manufacture our own guns, we should use our nuclear capability for social and economic progress. We should be on good terms with our neighbors and save the defense money. The army should be kept busy on projects for social and economic progress.

Professor Hasan Askari: I think we should continue our present nuclear policy to develop our nuclear capability without building a nuclear bomb and without giving up the option. If we ever build a bomb, it will be with India's consent. Being the first to make the bomb will not benefit us at this juncture, since it will not increase our capacity for self-defense. It will only increase our defense budget abnormally without solving our problem of self-defense. Building a nuclear weapon is not a simple matter. It triggers a series of other problems that must be solved as we go. First of all, we must find the means to build nuclear weapons. Once the means have been found our position will become stronger, but we should not take the first step. We should let India do that. Taking the first step will spoil our diplomatic position. If we promise at the United Nations that we are not building the bomb, and then produce a nuclear explosion, where will our credibility be? We need this credibility since we depend on U.S. aid. For some weeks past, India has been raising a hue and cry about Pakistan's building a nuclear bomb. I think only regional politics is at the root of this noise. Our pact with the United States is at an end and a new one has to be made.

India wants to spoil our chances of concluding a new useful pact with the United States. They want to tell the U.S. Senate that it is making a pact with a country that is builing a nuclear bomb. When the pact has been concluded, the hue and cry will stop. If some day in the future India attacks our bases, it will say that it is attacking Pakistan over the nuclear program against which it had warned the world in the past. There is another reason for the anti-Pakistan propaganda on the part of India. In December, a conference of the regional powers of Southeast Asia is taking place in Dhaka. The problem is that the smaller countries of the region are afraid of India in the economic field. India is fearful of the smaller countries joining together to form a front against it. India is giving Pakistan a bad name because it does not want it to become a leader of the smaller nations of the region and attack India. To prevent this, India is saying that Pakistan is developing nuclear weapons and blocking the way of peace. Under these circumstances, we should try to strengthen the cause of mutual protection and try to make Southeast Asia a nuclear-free region. We cannot prove India's propaganda false by building a nuclear bomb.

Mohammad Hanif Ramay: Islam means peace and security. A true Muslim wants peace not war. But our idea of peace is not to turn the other cheek after receiving a slap. Our Koran teaches us just the opposite lesson. In verse 60 of the Surah Infal, God says: "Be prepared for war so that the stamping hoofs of the stallions protecting your borders may strike terror in the hearts of God's and your enemies." It means that we should be so well prepared that our enemies should not dare to attack us. War is all around us. Our long eastern border with India has always been insecure, but now war has come to our northern border, too. We were one-fifth of India in 1971. Now we are only one-tenth. India's expansionism will make it attack us sooner or later. The only way we can protect ourselves is by developing nuclear weapons.

Do you think India will spare us if we do not develop nuclear weapons? It is not so. India will refrain from attacking us only if we possess nuclear arms. The atom bomb used in 1945 was the first and last such bomb ever used in history. Ever since other countries learned nuclear technology, no more atomic bombs have been used. The spread of nuclear technology has proved a deterrent to nuclear war. In our region, India, China and the USSR all have nuclear bombs. The sky will not fall if Pakistan also gets nuclear weapons. Why should Pakistan be singled out to be kept unprotected? It is ironical that even the United States, for which we have pawned our independence, despite being free, is against our protecting ourselves. Not only that, but it has even told India to deal with our country directly. Why? Because our rulers, who obey the United States at every step, have shown the courage to refuse to give U.S. bases like Budpir, and denied it the right to fly helicopters and planes across Pakistan to drop weapons to help the Afghan mujahidin. If the Gorbachev-Reagan summit next month is unsuccessful and the Soviet troops do not leave Afghanistan, U.S. pressure on Pakistan will increase. If our rulers do not obey the United States, it will retaliate by letting India attack us on the pretext that we are building a nuclear bomb. The United States knows that as soon as this happens the honeymoon of India and the Soviets will come to an end. They will become rivals just as India and China forgot their friendship after the war of 1962. The United States is going out of its way to flatter Rajiv Gandhi because it wants to cause a rift between India and the Soviets.

The security of Pakistan is our own responsibility. If we do not build the nuclear bomb at this juncture, it will be treachery of our homeland.

Dr Parvez Hasan: I have always said that our mental attitude towards India is quite wrong.

The rising generation in the two countries does not agree with ours. It will not be long before the people of both these countries will live in peace together. If the United States, which dropped the atom bomb on Japan, can become a friend of Japan, and the Germans and French can become friends, why can we and India not forget our quarrels? Let me put it another way: Our birth-rate is very high. Soon our population will reach a level where everybody will become poor. There are only a few ways to cope with this state of affairs. Our economy has long been dependent upon the foreign exchange sent home by Pakistanis working abroad, but that is not a dependable source of income. What is the way out of this situation? One way would be to discover oil in the country. There are examples of countries that solved all their economic problems after they discovered oil. The second method is this: Pakistan has plenty of arable land and the best irrigation system in the world. If we mechanize our agriculture and do things in a scientific way, Pakistan can, perhaps, become the foremost food-producing country in the region. This will solve most of our problems. The noise about the Islamic Bomb is both good and bad for us. It is said that Pakistan is building a nuclear bomb, but the money is being provided by another country. This is good news. If we build the bomb without spending our own money, it will make us a member of the Nuclear Club. We will be criticized for a short time, but the world will accept us, as it always accepts those who succeed in producing a nuclear explosion. Nobody liked our idea of founding Pakistan, but when Pakistan had been created everybody accepted us. So we will be accepted as a nuclear power. If we conduct a nuclear explosion without spending our own money, it will add to our honor. Conducting a nuclear explosion will give us a prestigious place in the third world, especially in the world of Islam. If some countries in the world think we have the capacity to produce a nuclear explosion, why should we deny it? I think once we build up a reputation as a nuclear power, many trade missions will start coming to us from all over the world. In the past, foreigners used to say about us: "These people cannot even sink a tubewell." When foreign engineers came to construct our Tarbela Dam, they asked if we had men who could drive tractors? People in other countries think we can do nothing, and need other people to do everything for us. Why were there more tenders for the Tarbela Project? Because at Mangla, the foreigners had discovered that this country has very capable men. Despite being uneducated our men worked the machines with the dexterity of those who had handled machines for generations. What I am trying to say is that producing a nuclear explosion will add to our prestige and give us a place of honor among the nuclear powers. Nobody will ask, "Can Pakistanis sink a tubewell?" They will say instead: "Pakistanis can build a nuclear bomb." This will bring us self-confidence. We shall enter the world of business with greater courage and be more successful. We will make progress like China where technology is transferred freely and every country is helped to make progress. This was the economic side of the question. I believe that some day our differences with India will be resolved and we shall come to terms with each other. It may take 10 or 20 years, but it will come about. Until such a time, there is no harm in building a nuclear bomb or two. This is the defense side of the question. Now, sir, we shall discuss the peaceful use of nuclear energy. We need to use this energy for generating power, though no foreign power believes us. The report of the Energy Committee says that our energy needs cannot be met by our present means.

That is why I said the night the budget was passed, "Your methods will fail. Only a deficit budget will result."

Zafar Chaudhary: Mumtaz Sahib, you have said that if India builds a nuclear bomb we should make one as well. You also said that we should have a deterrent (This word has become a cliche by now). We must first determine if the enemy intends to use the bomb. Then we have to find out when he intends to do so. A deterrent is something that prevents someone from doing something. Let us be practical. Let us suppose India takes possession of a part of the Siaichin Glacier. Will our having a nuclear bomb deter it from doing so? Or, to come nearer home, suppose India occupies a part of our territory in Rajasthan. How will our having a nuclear bomb prevent it from doing so?

Maj Gen Mumtaz Ali: The bomb is always used in the last resort. Our border with India is very long. If they build a bomb, we should build one also, and I believe they have built one.

Zafar Chaudhary: But if India has 100 atomic bombs, will it bully us?

Maj Gen Mumtaz Ali: They deny having any bombs at all, and also refuse to let inspecting teams enter their country. What does that prove?

Zafar Chaudhary: If Russia and the United States use nuclear bombs against each other, their great distance might save them, but India and Pakistan have the same borders, neither of the two countries can drop a nuclear bomb on the other without harming itself. It is just like Germany dropping a nuclear bomb on France. Only a brainless general could give such an order.

Question: Suppose both India and Pakistan procure nuclear bombs, will it not rule out the possibility of a war between them?

Zafar Chaudhary: No, because war will be fought with conventional weapons. The nuclear bombs will harm both sides equally.

Hasan Askari: In my opinion it is not essential for us to have a nuclear bomb only because India has one. In such a case, we should study the situation and try to find ways and means of protecting our country. Our aim is security and not merely to build a nuclear bomb. We should try to save our country by diplomatic methods or through guarantee from an international agency.

Zafar Chaudhary: My point is that after proclaiming to the whole world that we are not building the bomb, if we build one, we shall lose our credibility. I am not discussing whether we need such a large army and so much ammunition or not. I want to say that 90 percent of our weapons are imported. After we lose our credibility, neither the Soviets nor the United States will give us arms. Nobody after that will trust us. I agree with you when you say that conventional weapons should be answered with conventional weapons. We should be able to meet the enemy's challenge at every level.

Mumtaz Ali: The fact is that we know nothing about the expenses of building a nuclear bomb. When we think of the nuclear bomb we have in mind the bombs that destroyed cities like Hiroshima and Nagasaki. Smaller nuclear weapons, too, are being made these days. The question is: First, have we the capacity to build them and, second, can we afford them? What will be the political consequences of making an atomic bomb? I do not think that will make us lose our credibility. Look at Israel, South Africa and India. They have prestige, because they have power. Might is right in this world.

Question: We have been hearing a lot about Kahuta in the world media. A common Pakistani thinks that there must be something in it. Tell us this--have you only prepared to save Kahuta in the event of an air raid by India, or are you well prepared even if India makes a paratroop landing in our country?

Zafar Chaudhary: Personally I know nothing about the steps that have been taken for its protection. If the installations are underground, how deep are they? If a nuclear bomb is dropped on them, they will surely be destroyed. But I think they cannot be destroyed with the conventional weapons of war. If the installations at Kahuta have been constructed according to the latest technology, with the posisiblity of an air attack in view, then it would be difficult to destroy Kahuta.

As for paratroopers, I am sure arrangements have been made against them. In war, fortune favors those who are more alert and have made better preparations. We can never foretell in war.

Afzal Hyder: There is a danger of sabotage. You may call it commando action, but surely our air force must be protecting it.

Question: India is always making noise about the F-16. Is it true that the Jaguar cannot compete with it? Suppose two squadrons of Jaguars attack us, would it be possible to repulse them with the number of F-16's we have?

Zafar Chaudhary: Compared to the Jaguar, the F-16 is definitely superior, but having a few F-16's will not reverse the balance of power in our favor. India is 4-5 times stronger than we in military power. That fact remains even after we got the F-16. Then the last war between India and Pakistan will be fought on land, not on the sea or in the air.

Question: Have we got the means of delivery?

Zafar Chaudhary: No, we do not possess a rocket that could place a bomb in a particular location. It is possible for it to go to another place instead. It is even possible that the bomb will fall on one of our own cities. Aircraft is the only method of bombing a target. India, too, is in the same plight probably. As to the question of how many bombs a plane can carry and how far, it depends on the volume and shape of the bombs. I do not think a plane can carry four bombs to be dropped at different points.

Gen Mumtaz Ali: I want to say that a nuclear bomb, as such, is a big thing, but some countries have smaller nuclear bombs that can be used in the battlefield. There are small nuclear weapons that can be used against armies. It is hard to say which country has them.

Zafar Chaudhary: This advanced technology is beyond the means of both India and Pakistan. Then why should we make small nuclear weapons? Why not fight with conventional weapons instead? We should not try to compete with India. This is an impractical and impulsive way of thinking. Before 1971 there was some justification for this sort of thinking, but now it is out of date. India is 8 to 10 times stronger than we in most levels. If we think we can defeat India, it is unrealistic.

Question: We have been hearing for a long time that India is stronger than we. We have accepted it as true. Even our generals and intellectuals have accepted it. Have you ever thought about the negative effect of this belief?

Fazal Hyder: I say again that if you have it, you should have the moral courage to say that you have it. Do not play a double game.

Question: You said that the countries that do not need atomic weapons join a pact or depend on some particular country. They break the rules of non-alignment. Should we, too, join a military pact?

Zafar Chaudhary: I did not mean that. You see, we have tried both SEATO and CENTO. Our aims did not tally with those of the United States and France. That is why the pacts were unsuccessful. All small countries of the world are not members of such pacts. They have found their balance in their own particular position and environment. In every case we must be realistic, and make our plans and policies accordingly. This is not an impossible task.

Question: I thank you all. Good-bye.

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END

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21 February 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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21 February 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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PEOPLE'S REPUBLIC OF CHINA

CHINA'S NUCLEAR INDUSTRY EXAMINED

Economic Responsibility of Nuclear Establishment

Fuzhou FUJIAN RIBAO in Chinese 1 Nov 85 p 4

[Text] Beijing, 31 Oct (XINHUA)--China's nuclear industry, which had made significant contributions to the national security of this country and to world peace, is now entering its second phase. Most of its research and production capabilities are being directed to serve the economic development of China.

It is estimated that 80 percent of the products of China's nuclear instrument factories are being used for agricultural production and consumer needs; 80 percent of the construction and installation work force in the nuclear industry are now being used for urban and rural construction; in addition, research organizations and design institutes within the Ministry of Nuclear Industry have completed nearly 400 research and design projects which have produced positive economic benefits for the consumer industries. There is also an adequate reserve of nuclear fuel and other products required for the development of China's nuclear power industry. Early this year, in response to requests by officials of the State Council to "expand the scope of industrial applications based on nuclear technology," efforts to serve China's economic development have been further accelerated.

Nuclear Power Generation

Fuzhou FUJIAN RIBAO in Chinese 5 Nov 85 p 4

[Article by Zhuo Peirong [0587 1014 2837]]

[Text] Beijing, 4 Nov (XINHUA)--Today, a convention was held in Beijing in celebration of the 30th anniversary of China's nuclear industry. Attendees of the convention include model workers of the nuclear industry, representatives from advanced groups and advanced units, and concerned citizens of the nuclear community.

Representing the Central Committee and the State Council, Comrade Li Peng extended his warm congratulations to the pioneers, the party officials, the scientists and engineers, the technicians and other comrades working in the nuclear industry. He also expressed his sincere greetings to the model workers and representatives from the advanced groups and units.

Comrade Nie Rongzhen asked his deputies to convey his greetings.

The minister of nuclear industry, Jiang Xinxiong, gave a speech at the convention with the title: "Let us strive for innovation and make use of our past experiences; let us join forces in the struggle to develop China's nuclear industry." He said that by reviewing the hardships and achievements during the past 30 years, we can learn from our experience to guide our future development. He emphasized that the key issues of past achievements and future development are: party leadership, self-reliance and cooperation, establishing a team of ambitious and disciplined personnel, and developing objective scientific attitude and serious work atmosphere.

The chairman of the engineering committee of the National Defense Department Ding Henggao, the commander of the 2nd Artillery Corps of the People's Liberation Army Li Xuge, and Vice Admiral Zhang Xusan all expressed their thanks to comrades in the nuclear industry for their efforts in modernizing China's military forces; they also wished them continued success in their new mission of economic construction.

During the convention, awards were given to 207 model workers, 107 advanced groups, and 22 advanced units of the nuclear industry.

Beijing, 4 Nov (XINHUA)--In a speech delivered at the convention celebrating the 30th anniversary of China's nuclear industry, Vice Premier Li Peng emphasized that in serving China's economic construction, future development of the nuclear industry should concentrate on nuclear power generation.

Li spoke highly of the achievements of China's nuclear industry over the past 3 decades. He said: "In developing nuclear weapons, we have made significant contributions to the security of this country and to world peace. We have established an integrated system of nuclear technology and nuclear industry, and built a firm foundation for the peaceful use of nuclear energy. Now, the industry is entering a new phase where on the one hand it will continue to serve the needs of modernization of China's national defense, on the other it will shift its primary technical and industrial resources to economic development to further promote the peaceful use of nuclear energy. Comrades of the nuclear industry, let us explore this new era with confidence just as we did in the pioneering days!"

Li pointed out that nuclear power is an advanced energy source. We should strive to develop this energy source within this century and accelerate the development into the next century. The nuclear industry is expected to play a major role in developing nuclear power.

He also pointed out that the scope of applications of nuclear technology in economic construction and consumer needs should be expanded. While encouraging results have been obtained in the areas of medical treatment, food preservation, agriculture, and measurement technology, the range of applications should be further extended. The use of nuclear technology should go beyond the stage of research and prototypes and should produce practical benefits to economic construction and consumer needs.

In closing, Li said that the Ministry of Nuclear Industry should diversify its resources to different industries. Its labor force in construction and mechanical processing should be shared by the society, and its powerful team of technical experts should be made available for consulting and other activities.

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CSO: 5100/2

CHINA'S STAND ON NUCLEAR COOPERATION REITERATED

Fuzhou FUJIAN RIBAO in Chinese 11 Nov 85 p 4

[Text] United Nations, 8 Nov (XINHUA)--During today's special session on "A Report by the International Atomic Energy Organization," Qian Jiadong [6929 0857 2639], a special consultant to the Chinese delegation at the United Nations, reiterated China's position against supporting, encouraging, or helping other countries develop nuclear weapons.

Qian Jiadong said: "In cooperative efforts with other countries, the Chinese Government has taken measures to ensure that peaceful nuclear projects will not be redirected for military purposes. China's stand in this matter is firm and uncompromising. The accusations made by some people on this issue are completely unfounded."

He also rejected rumors about nuclear cooperation between China and South Africa. He said: "Everyone knows that the Chinese Government has always been strongly opposed to South Africa's apartheid and racist policies." China "has never had any association with the South African Administration, not to mention nuclear cooperation. This is a fundamental position of the Chinese Government which cannot be changed by people with ulterior motives."

Speaking at the General Assembly, representatives from the United States, Indonesia, Finland, Luxenburg, Democratic Germany and Czechoslovakia all praised China's recent announcement to submit several of its civilian nuclear facilities to the International Atomic Energy Organization for inspection and safeguard measures.

In today's closing session of the 40th General Assembly, a resolution was passed to urge all nations to participate in "effective and harmonious international cooperation" in order to promote the peaceful use of nuclear energy and the application of nuclear technology."

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CSO: 5100/1

CHINA'S NUCLEAR EXPORTS, INTERNATIONAL SAFEGUARDS DISCUSSED

Fuzhou FUJIAN RIBAO in Chinese 14 Nov 85 p 4

[Text] Beijing, 13 Nov (XINHUA)--A spokesman of the Ministry of Foreign Affairs said today that requests had been sent to nations which receive nuclear exports from China to accept safeguards of the International Atomic Energy Organization.

He said that the Chinese Government had made this point very clear.

During a news conference this afternoon, a newsman asked about China's reaction to a report in the 10 November edition of the SUNDAY THAMES, which quoted U.S. Senators Cranston et al as saying that China is exporting nuclear technology to Pakistan, South Africa, and Iran. The paper also suggested that the 46 U.S. Congressmen were justified in accusing Reagan for signing a nuclear pact with China.

The spokesman pointed out that the concerns raised by the U.S. Congressional members were completely groundless. He reminded the reporters that the Chinese Government had made repeated statements that China neither encourages nor participates in nuclear proliferation, nor does it provide assistance to other countries in developing nuclear weapons. He said: "In the area of nuclear cooperation with other countries, which include France, West Germany, the United States, Brasil, Pakistan, and Japan, whether these programs are already ongoing or under negotiation, they will be limited to peaceful use only; this policy is true today and will be true in the future." He emphasized that China and Iran do not have such a cooperative agreement; as for South Africa, China has no diplomatic relation whatsoever, not to mention nuclear cooperation.

Also during today's news conference, a spokesman of the Ministry of Foreign Affairs announced that at the invitation of President Mobutu of the Republic of Zaire, the Minister of Commerce Liu Yi will represent the Chinese Government to participate in the celebration of the 20th anniversary of the Republic of Zaire in Kinshasa on 24 November.

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CSO: 5100/1

DAYA BAY FUEL COULD BE DOMESTICALLY PRODUCED BY 1993

HK130842 Hong Kong SOUTH CHINA MORNING POST in English 13 Jan 86 p 6

[From the "South China Beat" column, based on research by Albert Chan and compiled by Timothy Jim: "Beijing Aims To Make Own Fuel by 1993"]

[Text] China hopes to produce its own fuel for the Daya Bay nuclear plant in 1993--one year after the plant is to go into operation.

According to the contract with the French reactor manufacturer, Framatome, China is obliged to buy the first load of uranium fuel from Franatone but it is then free to choose its own suppliers.

As about a third of the first load of the French fuel has to be replenished annually, it means theoretically the first load will be consumed in three years. It also means the Daya Bay plant may be using fuel produced on the mainland 12 months after commissioning when the first reloading is scheduled to take place.

A senior Chinese official with the Guangdong Nuclear Power Joint Venture Co says the main advantages of getting nuclear fuel in China are cost and safer transportation. He also said the contract with Framatome stipulates that the first load must come from France to ensure the reactors start up smoothly. This is also necessary because the uranium used for the first load has different properties from regular fuel and the French have years of experience in nuclear plant commissioning.

Another advantage of using French fuel for the first load will be in helping to spotlight trouble during the first couple of years of operation. It will be easier to establish whether any trouble stems from the reactors, the turbine generators or the fuel, if French fuel is used. However, because of cost and risk factors, China hopes to fuel the Daya Bay reactors with its own uranium as soon as feasible.

The Chinese official said that transportation of radioactive fuel from Europe to China involves a much higher risk than shipping it from closer by, Japan for example.

He cited the accident in August 1984 when a French cargo ship, the Mont Louis, which was carrying spent uranium, sank near Belgium. The higher risk would lead to higher insurance premiums and eventually to higher operational costs.

The Chinese official said that although the first reloading will only occur in 1993, a decision on where new fuel should be bought has to be made much earlier, probably three to four years ahead.

The fuel supplied by Framatome comes from another French company, Cogema, which is a nuclear fuel manufacturer that has access to uranium reserves in various places, including African countries and France itself.

China is currently working with Japanese interests to establish reserves of uranium in Tengchong County in the western part of Yunnan Province.

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CSO: 5100/4

HU YAOBANG, LI PENG MEET NUCLEAR SPECIALISTS

OW211606 Beijing XINHUA in English 1554 GMT 21 Jan 86

[Text] Beijing, 21 January (XINHUA)--General Secretary of the Chinese Communist Party Central Committee Hu Yaobang called on China's nuclear industry to produce more goods for civilian use and assist other industrial sectors.

Hu made the remark to 10 outstanding Chinese nuclear specialists at a meeting on peaceful use of nuclear energy here this afternoon. The meeting was also attended by Chinese leaders Fang Yi, Li Peng, Yang Shangkun and Hao Jianxiu.

The 10 experts are Jiang Shengjie, Wang Ganchang, Liu Xingzhong, Min Yaozhong, Huang Qitao, Yu Min, Lian Peisheng, Qian Gaoyun, Lu Dexian, and Sun Zuxun.

Hu said workers in the nuclear industry have made valuable contributions to the country. Due to their endeavors, China has beefed up its defense capacity with the development of its own nuclear weapons.

China has developed a basically integrated nuclear industry and trained a contingent of qualified nuclear technicians, a stage which, he noted, is significant.

Hu added that China's nuclear industry should produce more civilian-use goods and assist other industrial sectors.

Vice-premier Li Peng said the nuclear industry is confronted with the task of developing better, more extensive and peaceful use of nuclear energy.

Calling it one of China's fundamental policies, he said, "There are bright prospects for the peaceful use of nuclear energy."

To help other industries, China's nuclear industry should focus, among other things, on nuclear electricity generation, Li said.

The Vice-premier stressed that China should basically rely on itself while importing advanced nuclear technology.

State Councillor Fang Yi said China should foster a force of its own nuclear technicians and specialists, and strengthen the study of the peaceful use of nuclear energy.

Nuclear scientists and technicians should cooperate with universities and enterprises, so as to broaden the field of production.

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CSO: 5100/3

CANADA

STATUS OF URANIUM-PRODUCING INDUSTRY DISCUSSED

Toronto THE GLOBE AND MAIL in English 26 Dec 85 p B14

[Article by Oliver Bertin: "Luck, Vision Saved Uranium Firms"]

[Text] When Jane Fonda focused world attention on the nuclear industry with her 1979 movie, The China Syndrome, it helped precipitate a chain of events that Alan Lowell, vice-president of Rio Algom Ltd., describes as "the virtual decimation of the U.S. uranium industry."

That movie and the subsequent meltdown at Three Mile Island near Harrisburg, Pa., created such a regulatory nightmare that construction ground to a halt on half-completed nuclear power stations across the United States, leaving them as empty shells.

U.S. utilities were left with a five-year supply of uranium they could not use, and this led to an active spot market where fuel can still be bought for less than half the price it originally cost.

The U.S. mining industry fared no better. Production plummeted to about 11 million pounds from 44 million between 1980 and 1985, and many mines and mills were forced to close.

If there was any winner in the five-year debacle, it was the mining industry in Canada. Because of a combination of luck and foresight, companies such as Rio Algom and Denison Mines Ltd., both of Toronto, can look to modest growth through the 1990s.

They were lucky because Canada has been blessed with a wealth of low- and medium-cost uranium deposits, which have enabled the industry to fill the sales vacuum left by the closing of higher-cost U.S. mines.

They showed foresight because they decided many years ago to spread sales among customers in Japan, the European Community and Canada, and to insist on long-term sales contracts.

Largely because of the problems in the United States, Canada emerged last year as the largest uranium producer in the world, with production of 29.1 million pounds of uranium oxide and a 20-year order book exceeding $10-billion.

Rio Algom's sales manager Richard Schwarz remains optimistic about uranium prospects for the future despite the woes in the United States. He expects the world market to grow by about 5 per cent a year until 1990 and by about 2.5 per cent through to 1995.

Canadian demand is forecast to grow to about 5.9 million pounds of uranium oxide by 1995 and remain at that level beyond the year 2000. This compares with demand of about 4.4 million pounds in 1985.

Uranium prices have been improving for several months, reversing a decline that started in 1980. Industry experts say prices will continue to improve for the foreseeable future because demand is outstripping supply for the first time in many years.

If industry forecasts hold true, the surplus of unsold fuel that has depressed the market will dwindle faster than earlier expected, and could be exhausted by about 1990.

Rio Algom is further protected by supply contracts that total about 115,000 pounds of uranium oxide and extend to the year 2020.

Denison has long-term contracts — with Tokyo Electric Power Co. Inc. and Ontario Hydro — that total more than 150 million pounds of uranium oxide and extend through to the year 2012.

The key to Canada's uranium future, however, lies in Saskatchewan's Lake Athabaska basin, where deposits are among the largest and richest in the world.

There has been so much development in Saskatchewan in recent years that it has raised total Canadian production by 24 per cent the first seven months of this year.

The Cluff Lake mine — owned 80 per cent by French-owned Amok Ltd. of Saskatoon and 20 per cent by the provincial Crown corporation, Saskatchewan Mining Development Corp. — has recently completed a major expansion that will enable it to produce about 1,000 tonnes of uranium a year.

This is dwarfed by the Key Lake mine nearby, which has become the largest uranium mine in the world since it opened in June, 1984. President John Nightingale said the mine is producing about 4,200 tonnes of uranium a year from deposits that total 75,000 tonnes grading 2.5 per cent on average.

Ownership of Key Lake Mining Corp. of Saskatoon is shared by the provincial Government, the exploration arm of federal Crown corporation Eldorado Resources Ltd., and Uranerz Exploration and Mining Ltd. of West Germany.

The Key Lake deposits are dwarfed in turn by recent discoveries at nearby Cigar Lake. Not only are these proved reserves the largest in the world at 110,000 tonnes of uranium, but they are also 10 times richer than most.

This mine could come on stream about 1993 if the joint-venture partners decide to proceed.

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CSO: 5120/28

CANADA

RELIGIOUS GROUPS URGE MORE PUBLIC INPUT ON NUCLEAR ISSUES

Ottawa THE CITIZEN in English 27 Dec 85 p A5

/Unsigned article: "More Input by Public on Nuclear Issues Urged"/

/Text/ TORONTO (CP) — Decision-making on nuclear issues should be more accessible to the Canadian public, says a report commissioned by five religious groups.

In its 150 pages of findings released this week, the Interfaith Program for Public Awareness of Nuclear Issues concludes that, although nuclear energy is "an important and viable option among available energy resources," decision-making on its use should involve more checks and balances and be more open.

Set up after Canadian uranium exports to Argentina became an issue in the war with Britain over the Falkland Islands, the program was sponsored by the Anglican, Roman Catholic and United churches and Jewish and Baha'i communities. Hearings were held in October and November 1984 and a five-member panel examined several nuclear issues.

In calling for changes in existing decision-making processes, the report said there should be "more open and continuous debate" into whether nuclear power should continue to be the major new source of energy for Ontario and whether safety measures in the industry are adequate.

Calling for "more genuine consideration of options for different energy futures," the panel said organizations whose main job is the delivery of energy "should not dominate the process of weighing alternatives for the future."

The report said that nuclear power "must not be examined in scientific and technical terms alone," adding that "the insights — both expert and lay — about social, economic, environmental and public-health dimensions of nuclear power are necessary in the decision-making process."

The report also said that a number of submissions cited the need to deal with low-level radioactive wastes, and "unless these wastes are 'cleaned up,' the climate of the whole decision-making process for nuclear energy in Canada will be clouded with public rancor."

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CSO: 5120/28

CANADA

PACT REPORTEDLY NEAR ON WASTE DISPOSAL RESEARCH

Toronto THE GLOBE AND MAIL in English 27 Dec 85 p B9

[Article by Ritchie Gage: "Pact Near on Research into Nuclear Waste Disposal"]

[Text] WINNIPEG

A four-year nuclear waste research agreement between Canada and the United States will likely be signed within weeks, according to an official with the U.S. Department of Energy.

Patrick Wilkey, a Chicago spokesman for the U.S. nuclear waste disposal program, expects the pact to be signed before the end of January. He said his country wants to participate in the rock research near Lac du Bonnet, Man., because Canadian expertise will speed its own efforts.

(The United States has more nuclear electricity generating plants than any country in the world and more radioactive waste. It wants a solution to its disposal problems by 2006.)

The pending agreement will be a shot in the arm for the Manitoba project, which employs about 45 people. It will also be recognition for Canada's research expertise in this sector.

The commercial manager of Atomic Energy of Canada Ltd., Ray Sochaski, who works at the province's Whiteshell Nuclear Research Station, said he expects the agreement to be reached soon. Additional funds from the United States would give the research a big boost. About $17-million of the program's $19.2-million budget has been spent.

The Japanese Government has also shown interest in the program, Mr. Sochaski said.

AECL has amassed data on the potential of granite rock as a permanent storage vault for radioactive residue. Spent fuel, consisting of uranium capsules, must be stored for at least 500 years. It is currently stored under water at most Canadian and U.S. nuclear plants. The ultimate solution is to bury the waste permanently.

The research program is fundamentally a mining project. Researchers have bored and blasted a fifth of a mile into the granite. This allows scientists to test computer models of waste storage. Because water migration is the only way radioactivity can escape, hydrology data have formed a major part of the information base.

The U.S. contribution will provide the funds to push the shaft an additional fifth of a mile into the 300 million-year-old rock and facilitate further experiments.

Egon Frech, a public affairs spokesman for the program, said Government-owned AECL is convinced that rock burial is the answer to the disposal problem, but that the company's scientists "want an answer to every conceivable question which could be asked about disposal of radioactive waste."

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CSO: 5120/28

CANADA

AECL SEEKS TO BUILD NEW-STYLE REACTOR AT CHALK RIVER

Toronto THE GLOBE AND MAIL in English 4 Jan 86 p A13

/Text/ OTTAWA

The federal nuclear power regulator has been asked to approve construction and installation of a new kind of reactor at Chalk River Nuclear Laboratories near Petawawa, Ont.

The Atomic Energy Control Board said in a statement that Atomic Energy of Canada Ltd. wants to build and operate a prototype of the reactor, dubbed MAPLE for Multipurpose Applied Physics Lattice Experimental.

The new reactor is aimed at international markets, AECL told the board in its notice of intent, the first stage in the licencing process. The board approves construction of all reactors in Canada and monitors their operation. AECL, a federal Crown corporation, currently operates four research reactors at Chalk River, about 160 kilometres northwest of Ottawa.

If permission is received and the reactor is built, MAPLE will demonstrate the concept's workability and will also be used to produce radioisotopes for medical, industrial and research applications.

The MAPLE reactor will use a somewhat different concept than the other type of Canadian reactor, the Candu. It will use an open-tank-type reactor assembly within a light-water pool. The core is light-water cooled and moderated but includes a heavy-water reflector.

The CAndus, Canada's only commercial-size reactors, use heavy water for cooling and moderation of the reactor process.

The MAPLE will use low-enriched uranium fuel, operating at thermal power levels up to 20 megawatts. That level is about 1,000 times more than the most common Canadian research reactor, the Slowpoke.

Once the regulatory process is clear, AECL plans to locate MAPLE in a separate building adjacent to the NRX reactor building at Chalk River. It will share services with the 40-megawatt NRX, which began operation in 1947.

/12851
CSO: 5120/28

CANADA

BRIEFS

URANIUM DUST RISK STUDY--Ottawa--The Atomic Energy Control Board has commissioned an $850,000 study on the health effects of breathing air laden with uranium dust to find out more about the hazards of uranium mining. The five-year project, which will be reviewed by an independent panel of experts from other countries, is described as one of the first major attempts to document the effects of radioactive uranium dust. /Text/ /Toronto THE GLOBE AND MAIL in English 26 Dec 85 p B14/ /12851

CSO: 5120/28

BULGARIA

MINISTER INTERVIEWED ON ENERGY SITUATION, RESOURCES

Sofia OTECHESTVO in Bulgarian No 21, 12 Nov 85 pp 8-11

[Interview with Nikola Todoriev, minister of energy, on the occasion of the 13th Party Congress by the magazine OTECHESTVO; date and place not specified; "Energy Alarms, Energy Hopes"]

[Text] [Question] Comrade Todoriev, what energy raw materials of its own does our country have at its disposal and how are they being used?

[Answer] Nature has endowed us with very few energy resources of our own. The black coal that has been discovered, for example, is just enough in respect of quantity and qualities to say that we have any. Our brown coal--Pernik, Bobov Dol, Burgas--is also scarce. But its qualities are low, too. If we are not unique, we are at least one of the few countries that use in their thermoelectric power plants fuel with ash content of the order of 60-62 percent. This naturally gives rise to problems. The ash is highly abrasive, the equipment and heating surfaces deteriorate, and the breakdown rate of the steam generators is correspondingly great.

Another native raw material is lignite, the bulk of which is to be found in the Eastern Maritsa field. But here a refinement is necessary. The Americans designate as lignite coal which has a calorific value even over 4000 kilocalories per kilogram. In the GDR, the highest consumer thereof in Europe, its calorific value is 1800-2200 kcal/kg, with admixtures few and mainly sand. Our lignite yields 1150-1450 kcal/kg. If you squeeze a small lump of it in your hand and hit it against the wall, it clings there--oily, sticky clay, which makes it difficult to convey, pulverize, etc. Nevertheless, with the help of the Soviet Union we have begun to use this coal--now 20 percent of the country's electric power is obtained from it in the "Maritsa-Iztok" Complex. Hence the policy of developing native resources is absolutely right. Years ago a number of specialists--Bulgarian and foreign--asserted categorically that Eastern Maritsa lignite was clay and nothing could come of it. Someone had to manifest foresight and decide, "It will be developed!" The person who did this was Comrade Todor Zhivkov.

Some persist in thinking that Bulgaria is rich in water sources. But we are the water-poorest country in Europe, poorer than all our neighbors. That is why our country is setting about building an alpine series of hydroelectric power stations, with great water diversions running many kilometers to collect even the tiniest brooklets. Our hydroelectric plants are not built to operate on flowing water with a relatively constant discharge, for our rivers are small and become deep mainly during the melting of the snow. That is why our hydroelectric power plants are mostly situated on dam lakes. Our dam lakes serve multiple purposes--irrigation, industrial and drinking water, production of electric power. The proportion of hydroelectric power is not large but, by way of compensation, it is very valuable, for it is used to meet peak loads around the clock (a hydraulic turbine is started up very rapidly and at once takes up the load).

[Question] What impact has the drought of several years had on our country's water resources?

[Answer] This drought is a veritable disaster for Bulgaria. Our dam lakes now have water volumes below the permissible minimum at which operation of the electric power plants is authorized. Moreover, some of the series of hydroelectric power plants have dam lakes that cannot be filled in a single winter, with the result that we shall feel the drought even two or three years later with normal precipitation.

[Question] Bulgaria has outstripped many countries in the building of atomic power plants. What necessitated the development of atomic power at such a high rate?

[Answer] Shortage of our own resources and continuously increasing consumption of electric power due to industrialization of the country and an ever higher living standard. This growth of consumption had to be met from somewhere. Moreover, the party position on an overtaking rate of development of our power supply has always been and remains urgent, with the result that we had to resort to atomic power plants. But they have not been welcomed cordially. On the contrary, there have been many opponents and there has been almost no atomic-power-plant operating experience in the world. Atomic power plants have been constructed in only 20 countries. Indeed, it took both boldness and foresight to give the green light to the policy for which today there is no alternative. At that time the atom was still associated in people's consciousness with one of the grimmest and most devastating events of World War II. And once more Comrade Todor Zhivkov with his characteristic flair for innovation succeeded in assessing the part atomic power plants would play in our future development and in taking a firm stand fof them. Thus Bulgaria became the first in the Balkans to build an atomic power plant. Today we produce one-third of our entire electric power at "Kozloduy" Atomic Power Plant. In terms of this yardstick, only five countries in the world have outstripped us.

[Question] There are certain hazards involving violation of the ecological equilibrium by some activities in power engineering. I refer not only to the hazard of radioactive contamination, but also to the damage done to the landscape during the building of a series of hydroelectric power stations.

[Answer] Truth to tell, in the beginning no attention was paid to the ecology. Later on, however, things changed radically. Now tunnels, mainly, are built in order not to affect the landscape. Wherever there are canals, they are mandatorily covered, planted to grass, reforested, etc.

But the atomic power plants are less harmful to human beings than a single X-ray examination in the hospital. The radiation background at "Kozloduy" is three times as low as in Sofia. (Don't be alarmed, it's far below permissible norms in the capital, too.) The reason for the great difference lies in the exceptional measures against radiation contamination of the environment taken early on in the planning of the atomic power plant.

To be sure, radiation is no joking matter. That is why every atomic power plant is equipped with many means of defense. Otherwise, its operation simply would not be permitted. And, in connection with the use of nuclear fuel, let me remind you that a World Agency for the Peaceful Use of Atomic Energy exists. It has its inspectors everywhere and uses modern means of monitoring. In the reactor compartment of the "Kozloduy" Atomic Power Plant there is installed a sealed camera to keep track of the motion of the nuclear fuel. The camera is actuated only on the command of the inspector observing the power station, who has his headquarters in Vienna. Only he can remove the exposed reel from the camera during his periodic on-the-spot checkups. The international monitoring is very strict. And I would remind you that the last session of the National Assembly adopted a special law stricter than any similar laws in the other countries using atomic energy for peaceful purposes.

[Question] What is done with radioactive wastes and spent fuel? There have been hazards also involving thermal pollution and plans are now being made to increase capacities. . .

[Answer] Solid and liquid radioactive wastes are collected in special storage places serviceable for operation throughout the life of the power plant. As regards spent fuel, we are in an especially favorable position--we return it in a special container to the Soviet Union.

A special expedition, organized through CEMA to investigate the radioactive contamination of the Danube, has found that the "Kozloduy" Atomic Power Plant does not contaminate the river. So-called thermal pollution, however, is inevitable at such capacities. But since the amounts of water are huge, the temperature rise of the water is comparatively small. When the river level dropped, as it did this year, 1 or 2° variations may result. We do not exceed any permissible norms whereby we would harm the flora and fauna in the region.

[Question] Let us return from the ecology to the economy. The energy difficulties that our country has experienced and is experiencing are no secret to anybody. Let us once more seek the reasons for these; let us talk about the lessons that have been learned and the measures taken.

[Answer] The difficulties are overwhelmingly of a temporary character--the drought which deprived us of hydroelectric power plants, the long and severe winter, delays in putting some new capacities into operation, the shortage of our own gaseous and liquid fuels. We have some power plants which by now have each operated 25-30 years and which are both obsolete and outworn, given which objectively they operate at a higher breakdown rate.

Nor are the subjective weaknesses for the occurrence of troubles few. One of these is the lapses in the maintenance and operation of the power plants.

That is why this year we have channeled considerable resources into the repair of basic capacities. The volume thereof is 70 percent larger than last year. This has created complications in power supply during the summer season, but we have thus assured a better winter season. The repair campaign is continuing along basic lines.

To the subjective weaknesses let me add also excessively low discipline. There is some slacking and we are taking special measures against it. But we must look at the alarming facts from another angle as well. Labor in the energy sector is hard--continuous production process, different days off, underground work of miners, some unsolved material questions. That is why it is difficult to recruit and retain personnel--the result is considerable turnover. In one power-generating unit--and especially the atomic power-generating units, there is more electronic equipment than in some machine-building plants, but we cannot attract and retain electronic specialists. That is why recently a decree was adopted whereby the pay of miners and power workers was increased by 15-20 percent, additional remuneration was provided for, alleviations in pensioning, etc.

Let us go on with discipline. We have management personnel whom we have torn to pieces with criticism; yet the questions do somehow end up with them--downwards: the shift, the power-unit duty officer, etc., care only to have their working time come to an end and get away. Things which until recently were incomprehensible in power engineering. It is not just a matter of pay. Surely work with people has been neglected, too; surely the question of choice of vocation is of significance, too; and surely you, too, as journalists bear a certain blame--little is written about the hard and responsible occupation of power workers and miners.

[Question] What determines the establishment of the conditions of power consumption?

[Answer] Power engineering has characteristic features of its own. It has no stockpiles. The moment of production coincides with the moment of consumption. Therefore power engineering is controlled in centralized fashion. Even our limited resources would have been sufficient if consumption were but evenly distributed around the clock. But you know that is not so; power consumption peaks occur in the morning and evening. At that time for a period of 6-7 hours a capacity balance cannot be met. There are no hydroelectric power stations that have a 20-percent share and that are, besides, suitable as switching installations for regulating the power system. That is why the peaks must be "trimmed down."

[Question] Can we assume that as regards operating conditions we are at a holding point, i.e., we do not permit the overall situation to worsen so that we can count on improvement?

[Answer] In September, due to repairs and the reasons already enumerated, barely half the available capacities were in operation. The repaired capacities are already in service and we are progressing. But the lack of VETs [hydroelectric power plant] reserve will continue to be felt. A motor vehicle can move on four tires, but has a full set of five. At one time or another you will puncture a tire--a pipeline in the boiler will burst and the turbine will stop, and then we must have something to take up the load.

[Question] Another exceptionally important question is the economical consumption of electric power. Let us begin with your sector. What is the consumption of electric power for your thermoelectric power stations' own needs? What is being done to reduce losses in the carrying of electric power?

[Answer] The efficiency of our thermoelectric power plants tallies with their rated indicators. Those that operate with imported fuel operate with indicators such as are achieved in the countries supplying the equipment. This is not so, however, with the stations fired with native coal. Even there we are making progress. For example, at the "Dimo Dichev" thermoelectric power plant where our new technology is used, consumption for our own needs are nearly half those at "Purva Komsomolska" thermoelectric power plant. But it is technically impossible to achieve the 7 percent of the "Varna" thermoelectric power plant. A power plant at "Maritsa-Iztok" with capacities equal to the "Varna" thermoelectric power plant must process five times as much coal and release 10-15 times as much ash and scoria as the "Varna" thermoelectric power plant.

Ultimately production cost determines efficiency. And the electric power that we produce from "Maritsa-Iztok" has a comparatively low production cost.

[Question] What are the latest data on our electric power consumption and how do they look in comparison historically and with the data of other European countries?

[Answer] The Ninth of September found Bulgaria with an annual per-capita consumption of 45 kwhr. To be more graphic, as much as a 1000-watt hotplate would consume in operating for 45 hours. Last year we already had 5260 kwhr per capita. This year the situation will be almost the same. In electric power consumption we have caught up with the advanced countries in Europe.

During the energy crisis in the 1970's the Western world, which is rich in its own resources, introduced draconian measures, combined with economic controls, for the purpose of their economical consumption. And they worked successfully. We are a little late with the measures. But it is by now as plain as can be that efficient use of energy has to be recognized as one of the general thrusts of our energy policy. And our potentials on this score are actually large.

The February Plenum of the BCP Central Committee raised frankly and categorically the question of the necessity for structural changes in the economy and in technologies. We must develop industry whose requirements can be met with the resources that we have. But we must not harbor illusions that such changes take place all of a sudden and that we are going to call a halt now to enterprises with a large electric power consumption. The realistic course is different. First we are required to stabilize the existing industrial technologies and they must fit into the established consumption norms. At the same time we must modernize them or replace them with new ones that consume less energy for the same production. The potential reserves are great in the household sector, too. Consumption here has likewise grown appreciably, coming to 20 percent of the total volume, and together with the municipal sector to almost one-third. These are the figures for some of the most advanced countries, which, in contrast to us, have many cheap sources of energy. Since we do not have gaseous and liquid fuels, which are handiest for heating and cooking, the use of electric current has grown sharply. Even in the countryside where people used to love a roaring fire in the stove, there has been a changeover to electric radiators.

Advanced countries have begun abolishing overhead illumination and have changed over to local. Perhaps it does indeed create more coziness, but surely economies have something to do with it. Just go to the TsUM [Central Department Store] and have a look at the lighting-fixture. Our designers have racked their brains, it seems, over how to shade the electric lamp to the utmost rather than how to make optimum use of its light. Just see what we have come to in our present standards. A workshop is 100 meters long and 40 high, but the total illumination is overhead, lamp to lamp. Only two machines operate on the second shift, but the entire premises are lighted and heated. Yet resource-rich countries have introduced local illumination and local heating here too in order to economize.

[Question] In your interview on Bulgarian television and in the newspaper RABOTNICHESKO DELO you said that if the mass information media gave as much attention to energy problems as they do to water, you would be happy. What were your reasons for this?

[Answer] There is hardly a day when something is not written or said about economical water consumption and about the waste thereof. Perfectly right. The power consumption situation is likewise alarming, yet the necessary attention is not paid to it. But something has to be said, for example, to propagandize and inculcate economies. These habits must be created early in childhood. Maybe we are tardy, but we have now worked out lectures which must be delivered during the classroom teacher's hours in all schools. Children are more conscientious than adults. The Czechoslovak comrades in the evening during the minutes for the Sandman are urged to extinguish unnecessary illumination or turn off the superfluous appliance and the children indeed jump up at once and begin to put them out. Let me tell you about a curious instance. My physician acquaintance had gone for specialized training to Sweden, a country so rich in cheap energy resources that even its superhighways are illuminated. And in the laboratory only the laboratory assistant's table lamp was lit up. The Bulgarian asked what all this meant and she (the laboratory assistant) showed him the morning newspaper where in a corner in quite small letters it said, "Due to unforeseen failures, please switch off everything that is not needed." And that's all there was to it.

[Question] Obviously, in addition to propaganda work, at least at this stage, penalties for electric power wasters will also be necessary.

[Answer] This autumn and winter limitation of consumption in industry is anticipated. Moreover, take note that strict penalties, including penalties affecting the wage fund, will be imposed for the consumption of more power. Monitoring has also been intensified.

[Question] Inasmuch as there is a question of consumption monitoring, we should like to ask whether there is sufficient equipment to report the electric power that is consumed in industry.

[Answer] Unfortunately, this question still has not been definitively solved. There are not enough meters. It is anticipated that the number thereof will be increased. They will report not the enterprises' total consumption (it is metered right now), but the consumption of large machines and individual production lines. How are you going to compel a brigade to make economies if it doesn't know how much its section is spending? If one workshop economizes but the other overconsumes, the one that saved gets as much as the wastrel. But let us be clear: the problem will not be solved in a year or two. A great deal has been let slip by.

[Question] And will individual flowmeters be installed for centrally heated households?

[Answer] To date buildings have been constructed with vertical installations for central heating, which will prevent metering the thermal energy used by individual apartments. This is what is done for public buildings. For the entire housing block such general metering creates no incentives for individual families. As for regulators, a few thousand of them have been installed in Sofia. At all subscription stations, heat-regulating systems are now mandatorily installed. In the future it is anticipated that individual radiator regulators will be installed. I want to note that, beginning this year, in checking complaints about abnormally low temperatures in centrally heated dwelling units we will first of all look to see whether the windows are sealed. Unless they are, no action will be taken on the complaints. Our metering shows that in big cold spells good sealing, especially in paneled apartments, raises the temperature 2-3°.

[Question] May we place our hopes on new energy sources?

[Answer] Let me disillusion you a little although it is the "in" thing to speak of them. The most optimistic forecasts indicate that by the year 2000 solar energy's share--and only in certain countries at that--will amount to 2-3 percent. We, too, have a program; the new energy-source combine is working in our ministry. It produces solar collectors, heat pumps, and installations for the utilization of hot mineral waters. The matter of so-called secondary energy resources is quite different. Our country has many at-present waste-heat sources--furnaces, heat exchangers, drying chambers, etc. There are ways of using this energy, at least for in-house purposes of the enterprise in question. The use of new energy source will continuously increase.

[Question] What are the commonest outlooks for the development of the Bulgarian power supply during the present and the next decade?

[Answer] By 1990 atomic power plants' share of electric power will most likely amount to 40-42 percent, and in 2000 to 60 percent. In no event, however, will this form of power supply be developed alone. It operates under a basic load, and other, more maneuverable capacities are required to regulate the system. Such, for example, are the capacities of "Chaira" PAVETs [Pumping-Storage Hydroelectric Plant], which is now under construction. Additional capacities will be built at the "Maritsa-Iztok" Complex. Large cities in Southern Bulgaria will be supplied with heat by lignite-using power plants alone. The development of hydroelectric plants will continue although there are few hydroelectric sources not already included. Under construction to the Soviet Union via Romania is a 750-kilovolt power line, which will enhance the security of the national power system.

Speaking of prospects, let me point out once more the importance of efficient power utilization. Our experience teaches us that even the best monitoring system has never saved the situation unless the objectives thereof become everybody's conviction. Therefore, let us conclude with a wish: may the progress of the Bulgarian power supply become the cause not only of our sector, but of our entire economy, of every Bulgarian.

The editors thank Minister Nikola Todoriev for the explanations he has made. We understand that in a single--albeit long--conversation it is impossible to cover all the most acute problems and to discuss in detail the objective, as well as subjective reasons for power difficulties.

The magazine OTECHESTVO has opened its correspondent's post at the Ministry of Power Supply. We shall keep track of the routes of innovations into practice and the implementation of the programs that have been mapped out; we shall study cases of an irresponsible attitude towards energy.

In the next issue: "At 'Maritsa-Iztok' on the Eve of the New Winter."

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BULGARIA

REPORT ON CONSTRUCTION OF NUCLEAR UNIT NUMBER SIX IN KOZLODUY

Pace of Construction Stepped Up

Sofia STROITEL in Bulgarian 20 Nov 85 pp 1,2

[Commentary by Todor Tanev, Minka Tosheva: "Outlined Against the Sky"]

[Excerpts] The slashing icy wind hastens their steps toward Power Engineering House in Kozloduy. People of varied professions have gathered in this original creation of Bulgarian builders and architects. They have come to extend warm greetings to the international youth brigade of hero of socialist labor Ivan Lichev of the Industrial Construction Enterprise. It is not a formal 15th anniversary celebration. It is a warm commemoration of completion of a creative process, unique assembly operations, and of the minutes and hours of testing and inspection of the sixth nuclear power unit.

Bulgaria needs to expand its power resources rapidly. Duty draws the young people back to the banks of the Kozloduy. They are carrying out one of the most important construction and assembly operations. in 2-1/2 years the brigade has assembled more than 5000 tons of metal structural elements and is completing an average monthly volume of construction and assembly work representing more than 1.4 million leva. It has completed erection of the dome of the 1000-megawatt reactor and has received a rating of excellent for this extremely complex assembly operation. On the eve of the October Revolution, Vasili Goremski's team installed the last 85-ton block of the dome cornice of the 5th power unit, making it possible to concrete the dome and cornice of the the reactor section on schedule. There are currently more than 260 persons in the brigade, 70 of whom are Poles and 60 Vietnamese. Until recently there were also Cuban construction workers on the staff. Soviet specialists are rendering invaluable assistance to the brigade.

On 2 November, 5 days ahead of schedule, the brigade of hero of socialist labor Ivan Lichev completed assembly of the top of the reactor section cornice. The reactor shaft, the wet recharging shaft, and the cooling pond had already been checked off the list. After working intensely around the clock, the brigades of Marin Popov, Nartsis Monov, Todor Todorov, Stoyan Aleksandrov, and Milcho Gergov in the group headed by Stoyan Vladimirov had completed the construction work connected with the outer structure (the unsealed part of the reactor section) up to elevation 41.40 meters.

Lastly, the construction work and metal structure assembly was completed in the machine room. This work was done by the brigades of Zlatko Stoyanov and Yordan Mikhaylov.

The inaugural event during the days of the glorious 68th anniversary was pouring the bedplate of the 6th unit's turbine foundation. It began at 1100 hours on 2 November and ended on 8 November.

On more than one occasion the staff had to perform complex and important tasks in an extremely short period, and more than once it had to fight off enormous physical and mental tension at great heights in order to complete their tasks with honor. The unique experience gained in constructing the 5th unit, in continuous three-shift operation, and in reaching a fast pace not previously achieved not only has elevated the occupation of construction worker but will also serve to speed up the construction work on the 6th unit.

The labor and management personnel have become accustomed to the idea that the 6th unit must be built twice as fast as was the 5th.

The pouring of concrete for the foundation bedplate for the 1000-megawatt turbine was accordingly the first test, the first serious verification of the readiness of the entire staff of the Plant Construction industrial enterprise in Kozloduy to shoulder responsibility for the new and extremely important task.

I headed for the machine room of the 6th unit in the early morning hours of the first day of work after the holiday. It was quiet at the site. There were no construction workers or supervisors there. This was a day of rest for them. The gigantic one-piece concrete block, the turbine foundation, had been covered to keep it warm. The 90-day period needed for mitigation of the difficult temperature conditions had begun to run.

A literal battle to complete the important and responsible task had been in progress 2 days earlier.

For 6 days a track was worn between the concrete plant and the machine room. On each shift 16 concrete trucks shuttled back and forth, one after the other. The uninterrupted jerky thumping of the concrete pumps made it clear from far off that something noteworthy and on a large scale was taking place here at elevation 3.60.

The work was followed closely by the most responsible construction supervisors, engineer Oved Tadzher, engineer Marin Gankov, engineer Dimitur Dinkov, and engineer Todor Topalski.

On 7 November itself, while the workers were demonstrating in towns and villages, the concrete pouring was coming to an end. Victory was achieved at 1500 hours on 8 November.

"We are waiting for the last concrete delivery truck," were the excited words of technical director Vasil Nikolov speaking to me over the telephone. From the first cubic meter to the last we didn't stop working for a minute, even on the days when the spring rains fell. Comrade Tadzher is here with us now. He congratulated us on this great success."

A flash bulletin reporting completion of the task ahead of schedule was posted in conspicuous places the same day. All those who took part in the concreting and in the establishment of efficient organization had given an excellent account of themselves.

Two days after the concreting I spoke with the director of the enterprise, engineer Todor Topalski. When I asked him for his assessment of the organization of the work, he replied, "we knew just how large and important a task it was to pour the concrete for the turbine foundation bedplate. It was the most critical operation in this stage of machine room construction, firstly because of the large volume (5200 cubic meters of concrete), and secondly because of the continuity of execution required by the plans and specifications. We had already gained experience with the 5th unit, and so we concentrated our attention on the preliminary preparations. This enabled us to finish 4 days ahead of schedule without a single lapse during execution. I can say that the organization was flawless."

All that remains is for me to assess our accomplishments. The experience gained from them will serve us as a guide in our future work.

A substantial contribution to the efficient organization and the quality of workmanship was made by the construction laboratory headed by engineer Valentina Stoyanova, who said, "to meet the requirement of continuity of operation, we must assure precise timing all along the chain, from concrete mixing plant to concrete delivery trucks, concrete pumps, and production elements. Provision was made for bringing in standby equipment in the event of breakdowns. Snezhana Doneva, who monitored project execution, stayed with us until the last day of the concreting."

During the 6 days the construction laboratory took 600 samples to demonstrate the strength of the concrete and an additional 500 to monitor its consistency.

The concrete will continue to be inspected for a full 90 days after the date on which it was poured, to monitor and maintain the favorable temperature conditions stipulated in the specifications in order to avoid cracking of the concrete slab.

During the concreting, Dimitur Dinkov, construction foreman, had this to say about the schedule for completion of the machine room and tasks in the coming year: "The decision to concrete the bedplate for the turbine foundation by 7 November was made at a meeting with the activists at the beginning of October. This concreting had been scheduled for February 1986. The successful completion of this critical task creates conditions for completing construction of the machine room ahead of schedule.

Soviets Ship Shell for Bulgarian Reactor

Sofia POGLED in Bulgarian 4 Nov 85 p 6

[Commentary: "More on the Bulgarian-Soviet Atomic Dynasty"]

[Text] The nuclear reactor of the 5th power unit, the first 1000-megawatt generating set outside the Soviet Union, is standing firmly on Bulgarian soil.

The news was reported to the Moscow bureau of POGLED by Georgi Shumanov, a representative of the Bulgarian foreign trade company Tekhnoimport. The message read: The shell of the nuclear reactor earmarked for the 6th unit of the Kozloduy nuclear power plant has been completed ahead of schedule at the Izhorski plant in Leningrad. The operation of transporting the shell for its delivery to Bulgaria has begun. It has now reached Ilichovsk. The 4 steam generators for the 6th unit have also been finished ahead of schedule. One of them is also at Ilichovsk.

Scope of the Operation

A half-hour after the telephone conversation with Shumanov in the office of the Tekhnoimport company, another call was placed to Sofia, where there quite naturally interest in the movement of the nuclear equipment. The only concern for the time being is occasioned by the fact that the water level of the Danube has dropped in recent days, and the consignment shipped not only is out of the ordinary but is also among the heaviest.

The complexity of the transport operation can also be gaged by the meticulous care and precision required in the manufacture of equipment such as this. "The shop at the Izhorski plant where nuclear reactor shells are assembled is exactly 1 kilometer long," we were told by Shumanov, "but I mention this only to give an idea of the scope of the work. The manufacturing technology is much more important and difficult." In fact, the shell is assembled from a large number of forged metal rings. Inasmuch as they are to operate under extreme temperature and pressure conditions, not even the most minute flaw can be permitted in the weld seams. Every millimeter meter of a seam is checked by means of ultrasound and a magnetic field and is passed through x-rays and a flaw detector. This repeated and rigorous inspection obviously adds greatly to the cost of production, but this is is the only way to guarantee the extremely high level of safety typical of Soviet nuclear reactors.

Their design calls for a standby emergency system such that neither man nor environment will suffer even if the improbable happens.

An Additional Touch

There are currently 303 nuclear reactors in operation in 25 countries. According to information from the International Atomic Energy Agency, their power totals 275 million kilowatts and they annually generate 15 percent of the electric energy produced throughout the world.

Along with seven other countries belonging to CEMA, Bulgaria is in the family of "nuclear powers" and is an equal and active member of the socialist international organization Interatomenergo. Fyodor Ovchinnikov, the general director of this organization, said recently at a meeting with journalists accredited in Moscow that scarcely a decade earlier the most complex equipment intended for use in nuclear power plants in the socialist countries had been made exclusively in the Soviet Union. Now, he added, the products of nuclear machinebuilding are manufactured in 50 large plants and associations in 8 socialist countries. The Soviet Union and Czechoslovakia specialize in reactor production. Hungary turns out reactor repair equipment. Heat exchange equipment is manufactured in Poland. The GDR, Romania, and Yugoslavia provide cranes and special fittings. Materials for biological shielding of power plants are produced in Bulgaria, especially at factories in Radomir and Debelets. These materials are represented by special varnishes and doors (some of them even a half meter thick) used to isolate the highly restricted access areas of a power plant. These materials are also supplied to Tekhnoimport, and Shumanov stated in this context that Bulgaria is on schedule in meeting its obligations in this area. Nor have any complaints been received about defects or poor workmanship.

A Look at the Future

Specialists have estimated that a medium-sized city with 300,000 inhabitants requires around a trillion calories per hour for heating. Generating this heat by conventional means in steam boilers requires the burning of 400 tons of fuel oil. This estimate applies only to household needs; no allowance is made for industrial consumption.

It has also been estimated that heating needs will have doubled by 1990; that is to say, the consumption of fuel oil, coal, and natural gas burned in municipal boiler rooms will also have increased by this amount. And this will naturally also lead to greater pollution of the environment. But can't nuclear power plants also be used for heating?

Fyodor Ovchinnikov, general director of Interatomenergo, also has a comment on this problem. "The Soviet Union and the other socialist countries are extremely interested in this direction in nuclear power engineering. The summit conference of the CEMA countries adopted a program for development of nuclear power engineering to the year 2000, and under the program special attention is paid to nuclear thermoelectric power plants."

Two such thermoelectric power plants are currently under construction in the Soviet Union, one in Odessa and the other in Gorky. Although the latest nuclear technology is being applied in their construction, they have no complicated equipment and are easy to operate, and it is not mandatory for them to be built away from populated areas (the plant at Gorky is 10 kilometers from the city). The most important factor is economy. These power plants conserve 4 million tons of conventional fuel every year. "You can imagine," adds Ovchinnikov, "how much cleaner our cities will become. When there are nuclear thermoelectric plants, there will be no need for fuel oil or coal dumps and no need for special transportation. Nuclear thermoelectric plants will mean cities without smoke and soot."

The first unit in the series of standard nuclear power plants in service in the socialist countries was built in 1973 near Voronezh'. The renowned Voronezh' dynasty was instituted. Only 13 years have passed, and these plants are already in their third generation."

Military to Help Build Belene Nuclear Plant

Sofia TRUDOVO DELO in Bulgarian 12 Nov 85 p 1

[Article by Major Valentin Neshkov: "New Projects for Construction Troops--Belene Waiting for Military Builders"]

[Text] Construction of the second nuclear power plant has begun at a brisk pace. The dates for completion and commissioning the first 1000-megawatt power unit are also known. They are to fall in 1991.

The missions of the military construction workers in the unit in which officer Khristo Khristov serves were recently determined in greater detail. These troops are to build several important subsidiary facilities and the entire water supply and sewage network.

Certain difficulties have also arisen at the very outset and threaten to delay employment of the military construction workers. They are the absence of nearly 2 million leva in the planning estimates for the subsidiary facilities and the refusal by the Avtotransport economic organization to carry out production-related transportation of importance to the military unit.

Progress is also slow in solving the problems associated with planning and and construction of the troop billeting encampment.

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BULGARIA

PROGRESS REPORT ON ACTIVITIES AT KOZLODUY 1000 MW UNIT

Sofia STROITEL in Bulgarian 20 Nov 85 pp 1,3

[Article by Tsvetan Furenski: "At Kozloduy: 1000 Megawatts Multiplied by Hopes and Problems"]

[Excerpts] It is now autumn of the 15th year of construction of the nuclear power plant at Kozloduy. The first rains have fallen, and it has turned cool, but with every passing day activity is heating up at the gigantic construction site. Nearly 17,000 construction and assembly workers from a wide variety of organizations throughout Bulgaria have converged on the site and are working in 3 shifts round the clock.

The object is to complete construction of the 5th nuclear unit on schedule, so that the new amounts of electric power for which people have been waiting will begin to flow through the power lines of the country.

Here at the end of 1985 the outline of the main building of this project, consisting of the domed reactor section and the square machine room attached to it, will rise almost to its full extent against the background of the Kozloduy Lowland. We say "almost" because the Western portion of the reactor section has not yet been fully erected and now resembles the broken wing of a bird. The only reason is that some heavy equipment still has not been delivered, a main and a standby lock from the Heavy Machinebuilding Complex in Radomir and 3 condensate pumps from the Vaptsarov plant in Pleven. Of course, these are not the only items missing from the long list of machines and equipment due from Bulgarian enterprises, but they are the ones generating a crisis by preventing both timely preparation of the facility for operation under wintertime conditions (many delicate mechanisms must be installed with air conditioning systems in operation) and ultimate start-up on schedule. Will we learn a lesson from the dozens of machinebuilding plants in the Soviet Union, which this year alone have already delivered 50,000 tons of equipment, thereby completely fulfilling their obligation toward the first Bulgarian nuclear energy endeavor?

Regardless of the enormous volume of work which must be done to meet the start-up deadline, it is nevertheless an encouraging fact that a governmental start-up coordinating commission is already in operation at the nuclear power complex. It has begun the process of full or partial acceptance of a considerable part of the component facilities (the combined auxiliary building, the chemical water treatment plant, the petroleum management unit, and 3 stories of the engineering and laboratory building). However, attention continues to be centered on the main building. It is expected that the bulk of construction work on it will be completed by the end of December. The equipment is also being installed at a fast pace. An especially important process is that of installing complex machinery and equipment, including the computer system, so that the 5th reactor, unlike its predecessors, will operate in a fully automatic mode. This task has been assigned to a joint Bulgarian-Soviet work brigade, which has pledged itself to complete the task in 3 months rather than 6, a record not yet set even in the Soviet Union.

Considerable effort, skill, and extraordinary precision are also being applied in welding the pipelines of the so-called primary loop system. Unlike their predecessors (with a diameter of 500 millimeters), these pipes have a diameter of 850 meters. Water heated by the decay of atomic nuclei will flow through these pipes, transferring its heat to the pipelines of the second loop and from them to the turbine. The work brigade led by order bearer Ivan Zhabov and dispatched by the management of Energomontazh in Varna is actively assisted by skilled assembly workers under the direction of Hero of Socialist Labor Ivan Stefanov. This brigade is now at work installing the first 1000-megawatt turbine in Bulgaria. It is expected to be ready for testing no later than the end of March 1986. Enviable effort is also being exerted by the groups headed by Ivan Dimitrov, Evtim Stamov, Dimitur Stefanov, and Dobrin Todorov. Considerable assistance has been provided by the Kharkov Turbine Plant, and especially by engineer Igor Lobanov.

One comment is to be made to the designers, and it should not fail to be taken into account at least in construction of the 6th nuclear unit and the nuclear power plant at Belene. In the machine room alone, hundreds, perhaps even thousands, of cylinders of oxygen are used up every day. Each cylinder is carried by an assembly worker on his back, together with the pipes belonging to it. It is a struggle for the workers to carry the cylinders up the steep steps of the temporary iron ladders. Wouldn't it be possible to supply the site entirely from the nearby oxygen plant over temporary pipelines and to build a temporary elevator for the workers and part of the equipment? This would save both time and human labor, and has in fact been done at a number of nuclear power plants in the Soviet Union.

The construction of the nuclear energy complex at Kozloduy is a project involving a huge staff of workers and many construction and assembly organizations. Following are comments made by some of the management personnel.

Engineer Todor Topalski, head of the plant construction management division, states that "we have already provided a full complement of services to the assembly organizations and are currently maintaining a standby service which will give assistance in the event of any difficulty. We deftly shift resources from the 5th to the 6th unit and back. We follow a simple but precise and clearcut formula in our operations, which is that each work site must have the optimum number of construction workers. We have already fulfilled our five-year plan."

Engineer Stoimen Maksimov, head of the energy equipment installation division, says: "Our work is moving along very well now. Our only problem is that we still do not have enough experienced skilled laborers."

Engineer Dimitur Dinkov, construction chief, has this to say: "Although there is still much work to do on the 5th unit and the deadline is approaching, in accordance with the resolution passed by the Council of Ministers in March of this year, we are already getting set up and are regrouping our forces to build the 6th unit. The entire construction process should take no longer than 3 years, that is, it will be completed 1-1/2 times faster than the 5th unit. In view of the experience we have gained by now, the elimination of the errors made in the design in the past, the decisive assistance provided by the Soviet specialists, and the fact that a large number of the powerful subsidiary facilities will serve the 2 units simultaneously, we are convinced that we will also meet the new deadline."

The conviction of the management and specialist personnel is also being translated into an article of faith of the construction and assembly workers. The eyes of workers all over the country are now on them. In the public at large hopes are being transformed into expectations of an additional 1000 megawatts in the year to come.

6115
CSO: 5100/3010

NATION'S ROLE IN CONSTRUCTION OF CEMA NUCLEAR POWER PLANTS

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian, Vol XXXVIII, No 7-8-9, pp 279-286

[Article by Sandor Bajza, graduate mechanical engineer and a department chief in the National Plan Office, and Karoly Toth, graduate mechanical engineer and deputy director general of the Interatomenergo International Management Association: "Hungary's Participation in the Realization of the Nuclear Power Plant Construction Program of the CEMA Countries"]

[Text] The participation of the Hungarian People's Republic in realization of the nuclear energy program of the CEMA countries is determined primarily by the integration which has developed in nuclear energetics machine manufacture. The Complex Program for the socialist economic integration of the CEMA countries approved in 1971 already prescribed the multilateral manufacturing specialization of nuclear energetics equipment. On the basis of a resolution of the CEMA Executive Committee the Interatomenergo International Management Association formed in 1973 conducts the work begun within the framework of the Machine Industry Permanent Committee of CEMA.

The long-range target program for cooperation to be conducted in the area of fuel-energetics and raw material branches, which developed on the basis of high level CEMA resolutions, prescribed the supplying of the most important energy sources to the economies of the CEMA countries. In the course of carrying out this program great attention had to be turned to more rational use of domestic reserves, the introduction of less material demanding technological processes and the development of nuclear energy. Satisfying the constantly increasing electric power needs of the CEMA countries required an accelerated development of nuclear energy. The share of the nuclear power plants in producing electric power is constantly increasing and according to available forecasts it will reach about 25-30 percent of the world electric power production by the year 2000. In accordance with these requirements the construction of nuclear power plants has accelerated in the socialist countries too.

Hungarian-Soviet Bilateral Agreement

Realization of the significant volume nuclear energy program made it necessary to ensure manufacturing capacity within the framework of socialist economic integration. For the 1976-1980 period the cooperation developed on the basis of bilateral agreements between the interested CEMA countries and the Soviet Union on a cooperative basis. Thus Hungary also undertook to introduce

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6 March 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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6 March 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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HONG KONG

ENVIRONMENTALISTS CONCERNED OVER DAYA BAY PROJECT

Hong Kong SOUTH CHINA MORNING POST in English 7 Jan 86 p 2

[Editorial]

[Text]

Not all doomsday forecasts about the nuclear industry, it would appear, are the products of inspired or malicious conjecture.

It will be recalled that 20 per cent of the core of the nuclear-powered electricity generating plant at Three Mile Island in Harrisburg, Pennsylvania, melted down on March 28, 1979. That was just weeks after the release of a film called *China Syndrome*, featuring Jane Fonda as an investigative reporter in a mythical accident in a nuclear plant.

Just this past week, when environmentalists have been expressing concern over the impact of cost-cutting on the safety of equipment to be installed in the proposed Daya Bay nuclear plant in Shenzhen, we have read the news of an explosion at a nuclear fuel plant in Gore, Oklahoma, during the weekend. The result was one death and injuries to at least 100 people.

It is not at all reassuring to be told that the Kerr-McGhee Company, which operated the Oklahoma plant, figured in a controversy in the 1970s.

At that time, Karen Silkwood, one of its employees, died in a mysterious car crash. Ms Silkwood, believed to be a victim of plutonium poisoning, had earlier been involved in a running trade union battle with her employers over safety standards at the plant.

The exact cause of Saturday's accident will not be known until after the investigation by the United States Nuclear Regulatory Commission. However, the cloudburst of toxic, radioactive, hydrochloric acid gas on Saturday is attributed to a blast which ruptured a 14-ton manufacturing tank.

The cause of the explosion is what continues to be a mystery. Such sparse reports as have emanated from the accident site suggest that workers were using an untested process to expel gas from a tank. That, in turn, ruptured the tank. This led to the release of corrosive, radioactive gas.

The acid, used commercially for etching glass and to clean metals, is believed to be so lethal that it can kill instantly on contact. Also, a leak of as little as 9.5 ounces is deemed dangerous at 200 feet.

Those being treated at hospital in Gore have complained of skin and eye irritation. Inhalation of the toxic fumes is also reported to cause irritation of the respiratory tract, besides vomiting and diarrhoea.

All this must weigh heavily on the minds of local environmentalists, headed by the Hongkong chapter of Friends of the Earth, as well as other concerned members of the community.

Criticising the wall of silence over the planning of the Daya Bay plant, particularly its safety standards in the event of an untoward accident, the spokesperson for the Friends of the Earth, Ms Linda Siddall, said: "We have absolutely no reason to welcome such a project."

On the subject of cost-cutting over the Daya Bay venture, Ms Siddall was equally emphatic. "Price and quality are always closely linked and we are very concerned...(and) the implication is terrifying."

Considering the Three Mile Island reactor reported a leak of radioactive material 13 days after it was restarted in October, one cannot accuse Friends of the Earth of overreaction, given the latest explosion in Oklahoma.

In fairness, the community here is entitled to a categorical and unqualified assurance that the amended terms agreed upon by China and Britain's GEC group and France's Framatome, for the purchase of equipment for Daya Bay, will in no way dilute safety standards at the plant.

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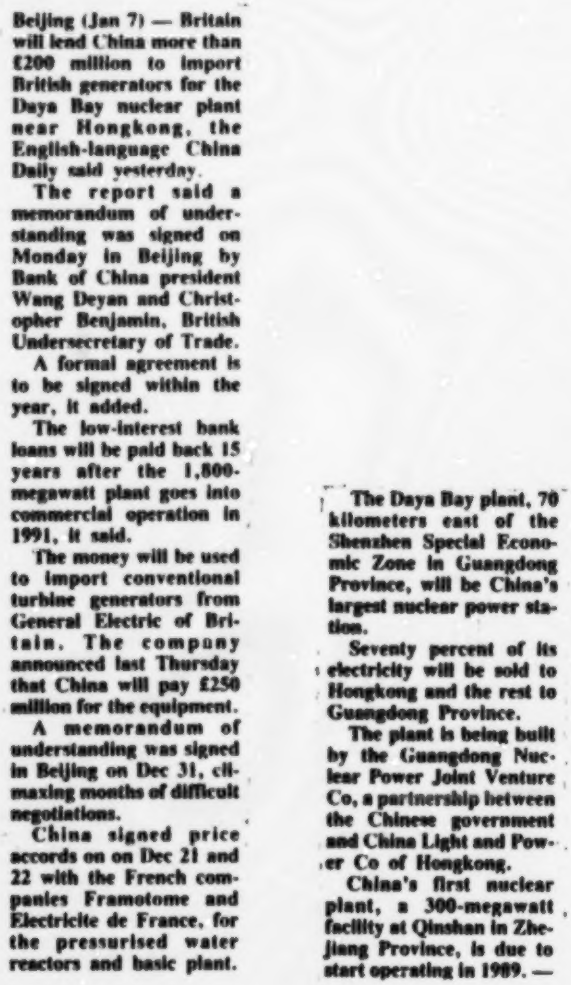
CSO: 5150/0068

PROGRESS TOWARD DAYA BAY NUCLEAR POWER PROJECT REPORTED

Memorandum Signed in Beijing

Hong Kong HONGKONG STANDARD in English 8 Jan 86 Supplement p 1

[Text]



Beijing (Jan 7) — Britain will lend China more than £200 million to import British generators for the Daya Bay nuclear plant near Hongkong, the English-language China Daily said yesterday.

The report said a memorandum of understanding was signed on Monday in Beijing by Bank of China president Wang Deyan and Christopher Benjamin, British Undersecretary of Trade.

A formal agreement is to be signed within the year, it added.

The low-interest bank loans will be paid back 15 years after the 1,800-megawatt plant goes into commercial operation in 1991, it said.

The money will be used to import conventional turbine generators from General Electric of Britain. The company announced last Thursday that China will pay £250 million for the equipment.

A memorandum of understanding was signed in Beijing on Dec 31, climaxing months of difficult negotiations.

China signed price accords on on Dec 21 and 22 with the French companies Framotome and Electricite de France, for the pressurised water reactors and basic plant.

The Daya Bay plant, 70 kilometers east of the Shenzhen Special Economic Zone in Guangdong Province, will be China's largest nuclear power station.

Seventy percent of its electricity will be sold to Hongkong and the rest to Guangdong Province.

The plant is being built by the Guangdong Nuclear Power Joint Venture Co, a partnership between the Chinese government and China Light and Power Co of Hongkong.

China's first nuclear plant, a 300-megawatt facility at Qinshan in Zhejiang Province, is due to start operating in 1989. —

British, French Contracts

Hong Kong SOUTH CHINA MORNING POST in English 9 Jan 86 p 11

[Article by Albert Chan]

[Text]

British and French engineers hope to sign letters of intent for contracts on the Daya Bay nuclear plant in early March.

They will spend the next few weeks in Shenzhen working on details of the documents.

Meetings between the French nuclear reactor manufacturer, Framatome, and the Guangdong Nuclear Power Joint Venture Co began on Monday while engineers from the British GEC group, which will provide turbine generators to the plant, will start similar discussions with the Chinese shortly.

According to a senior Chinese official, recent amendments to the various contracts need checking.

Officials said it has been agreed that letters of intent should be issued to both the British and French companies no later than May 1.

It is expected that the three Governments would need about six months to study and approve the contracts before actual signing could take place.

The current work on the letters of intent is expected to take a month, the official said.

Meanwhile, Bank of China and British bankers led by the Midland Bank have reached agreement on the loan arrangement for the purchase of £250 million (about HK$2.78 billion) worth of equipment which GEC is going to provide for the project.

A memorandum of understanding was signed on Monday in Bejing by Bank of China president Mr Wang Deyan and Mr Christopher Benjamin, British Undersecretary of Trade.

The low-interest bank loans will be paid back 15 years after the 1,800-megawatt plant goes into commercial operation, scheduled for the third quarter of 1992.

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CSO: 5150/0067

CONCERN EXPRESSED OVER U.S. NUCLEAR WASTE SITES

Federal Study

Ottawa THE CITIZEN in English 17 Jan 86 p A20

[Article by Michael Tenszen]

[Text] WINNIPEG

Manitoba will fight any attempts by Canada or the United States to put nuclear waste dumps at Lac du Bonnet, Man., or in northwestern Minnesota close to the province's border, Premier Howard Pawley said yesterday.

Mr. Pawley said he had a recent oral commitment from federal Energy Minister Pat Carney that Atomic Energy of Canada Ltd. will be prohibited from locating an underground nuclear waste dump at the southern Manitoba site. He said the minister was asked to put that promise in writing but the wording in the subsequent Telex message was not strong enough and he has asked for another.

An Energy Department source said later yesterday that another message will be sent soon to Mr. Pawley giving him the Energy Minister's unequivocal assurance that no underground storage site will be allowed by the federal Government in Manitoba.

The AECL has a large station in the Pinawa-Lac du Bonnet area, about 80 kilometres northeast of Winnipeg near the Whiteshell Provincial Park on the Ontario border. It is conducting extensive research there into storage of radioactive waste in the granite bedrock.

Anti-nuclear activists believe that, if the site proves suitable, AECL will open a large, commercial nuclear waste dump. They say a leak in such a dump would threaten ground water with radioactivity.

Last week, the U.S Department of Energy said it is considering an underground nuclear waste dump at one of four possible sites in northwestern Minnesota.

Mr. Pawley said yesterday that any of the sites, two of which are 10 and 26 kilometres from the Red River, would be unacceptable to Manitoba. The Red River flows from the United States through Winnipeg and on to Lake Winnipeg. Mr. Pawley said Manitobans do not want "huge quantities of radioactive materials" near their border, where substances could leak into the Red River and Rainy River systems.

Mr. Pawley released a copy of a letter he sent yesterday to federal Minister of External Affairs Joe Clark, urging him to "ensure that our concerns are made known to the U.S. Administration in the clearest possible way." Mr. Pawley tells Mr. Clark that the governor of Minnesota has also expressed strong concerns about the possible dump site in his state.

Manitoba Environment Minister Gerard Lecuyer said yesterday it will take AECL about 20 years to complete its research at Lac du Bonnet. He said AECL has assured him that no commercial nuclear dump site will be located there against the wishes of Manitobans.

Walter Robbins, spokesman for Concerned Citizens of Manitoba Inc., the main action group here opposing nuclear dump sites, said the extensive research that is being conducted at Lac du Bonnet will make the area a natural one for a large, profit-making dump to service the continent's huge buildups of nuclear waste.

Manitoba Officials

Toronto THE GLOBE AND MAIL in English 22 Jan 86 p A4

[Text] WASHINGTON (CP) — Seven of a dozen sites announced Thursday as the most acceptable locations for a controversial U.S. nuclear waste dump are in northern border states, prompting the federal government to promise a study of potential danger to Canada.

The U.S. Energy Department is going to choose one of the 12 sites in 1998 to build a giant permanent underground dump to hold radioactive nuclear waste and spent fuel that now is accumulated in temporary storage pools around the country.

Six of the sites are in states along the Canadian border Minnesota, Maine and New Hampshire. One is in Wisconsin, bordering the Great Lakes. The others are in states farther south — Virginia, North Carolina and Georgia.

External Affairs Minister Joe Clark said in a statement released here that he is pleased the U.S. government honored Canada's request to exclude any sites within 40 kilometres of the Canadian border. But he noted one site in Maine is just outside that limit.

And Canada is concerned that some of the border state sites among the 12, or in a list of eight backup sites, are in or near water basins that drain into Canada, a factor that will now be studied. Clark said the government opposes any development that could pose a threat to Canadians

While Clark didn't mention it, Canadian officials said they were pleased the list of near-final candidate areas excludes sites in northern Vermont along the Quebec border where Canadians and Americans have been protesting the prospect of a nuclear dump in their backyard.

Canada's concerns centre on the potential impact of a site in Maine on the St. Croix watershed of New Brunswick, two sites in Wisconsin because of drainage into the Great Lakes, and four sites in Minnesota in the Red River basin of Manitoba.

The U.S. Energy Department announced a list of 20 so-called candidate areas with the 12 sites ranked as the most acceptable. They were chosen from a list of 235 locations.

After more study of the rock formations at each site, the list will be shortened to three in 1991. The dump would be like a large underground mine, surrounded by buildings on a 160-hectare site. It would be one of two dumps to hold radioactive waste from nuclear plants and weapons production facilities. The other dump, to be in Nevada, Texas or Washington State, is to be chosen in 1994.

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CSO: 5120/29

CANADA

RADIOACTIVE WATER LEAKS REPORTED AT TWO SITES

Douglas Point Station

Toronto THE GLOBE AND MAIL in English 24 Jan 86 p A8

[Article by Thomas Claridge]

[Text]

Crews preparing Ontario Hydro's Douglas Point Generating Station for abandonment have found that a large pool filled with radioactive fuel bundles is leaking.

Station manager Allan Holt said yesterday that calculations made since the discovery early this month indicate that about 60 litres an hour is flowing into a sump system designed to collect ground water.

Mr. Holt said that since the discovery, the discharge water has been sampled daily to ensure that it stays within a Hydro target for radioactive emissions to the lake.

"The leak presents no hazard to employees or the public," he said, adding that the principal contaminant, cesium, is at a concentation below 1 per cent of the limit set by the Atomic Energy Control Board.

Mr. Holt said the mildly radioactive pool water was mixing with at least 20 times as much ground water routinely reaching the sump.

"We pump out between 7,000 and 8,000 gallons a day, and up to 30,000 gallons if it rains," he said. The current leakage rate from the pool is about 6 per cent of an average day's total collection in the sump.

Hydro crews were closing a water-treatment plant when they noticed that water in the pool was disappearing at a rate too high to be explained by evaporation.

Asked how long the leak could have been undetected, Mr. Holt said it "could have been there for quite a while."

The Douglas Point station near Kincardine, the first commercial-size Candu power plant, is owned by Atomic Energy of Canada Ltd. Hydro managed the station and purchased the power it produced between 1967 and 1984.

It was closed on May 5, 1984, after AECL decided the plant was uneconomical to run and Hydro concluded it was not worth purchasing for a token $1. Since then, AECL-supervised Hydro crews have removed the fuel from the reactor and drained all piping systems.

"We're draining all hazards in the station so it can sit quietly for 10 years," Mr. Holt said. Once radioactivity in the building has reached acceptably low levels, the station will be demolished.

The pool, which Mr. Holt described as 18 metres long, 7.5 metres wide and 7.5 metres deep, contains about 22,000 fuel bundles and about 1.6 million litres of ordinary water.

Although the immediate objective of Hydro and AECL is to locate and plug the leak, possibly with ultrasonic devices, Mr. Holt said AECL is also looking into the possibility of removing the fuel, storing it elsewhere and draining the pool.

New Brunswick Power Plant

Toronto THE GLOBE AND MAIL in English 25 Jan 86 p A4

[Text] The nuclear power plant in this community near Saint John, N.B., has lost almost 3,000 kilograms of heavy water since it sprang a leak exactly a month ago. But Roland Krause, spokesman for the New Brunswick Power Commission, said yesterday that the leak is manageable and will not be fixed until a scheduled maintenance shutdown on April 25. The heavy water is 10,000 times less radioactive than the level considered safe by the Atomic Energy Control Board, and is diluted with salt water before being flushed into the Bay of Fundy, Mr. Krause said. The pinhead-sized leak is somewhere in one of the 3,500 steel tubes running through the reactor cooling system and would be virtually impossible to detect without shutting the reactor down, he said.

/9274
CSO: 5120/30

CANADA

AECL SUGGESTS SMALL REACTORS FOR NORTH, SETS SALES TARGETS

Small Reactors for North

Ottawa THE CITIZEN in English 16 Jan 86 p B24

[Text]

SASKATOON (CP) — Small nuclear reactors may be the key to providing heat and electricity to Northern Canada, say officials of Atomic Energy of Canada Ltd.

"There are a number of places in the North that could use them that aren't connected to an electrical grid and don't want to haul in fuel at a big expense," said Dave Brown, an Atomic Energy spokesman at Whiteshell, Man.

A two-megawatt demonstration reactor — one-fifth the size of the small commercial units planned by Atomic Energy — is under construction at the nuclear research facility at Whiteshell and is expected to be operating by September.

Metro Dimitriw, who's responsible for marketing, said Atomic Energy will be prepared to make a commitment to sell one of the small Slowpoke reactors to a community within the following year.

Slowpoke stands for Safe Low Power Critical Experiment.

Dimitriw said Atomic Energy sees several dozen centres as potential customers. Most are in the Northwest Territories, but some places like Fond-du-Lac, Uranium City and Wollaston Lake in northern Saskatchewan might also be candidates.

A 10-megawatt reactor could serve a community of 800 to 2,000 people.

Dimitriw said nuclear-generated heat can compete with any source except natural gas anywhere in Canada.

Electricity generated by the Slowpoke, on the other hand, costs about 25 to 35 cents a kilowatt-hour compared with three to six cents charged to residents in major cities.

"So, in southern communities, it's out of the question."

In remote northern communities, Dimitriw said, people pay far more than 25 cents a kilowatt-hour for electricity generated using diesel fuel.

"The only way we will know it is economical will be to look at individual communities.

Safety, he said, is a major selling point.

"The Slowpoke can operate unattended for days, weeks or months at a time."

Like the reactors used at several Canadian universities, it uses ordinary water as a moderator for the nuclear reaction. That's considered safe because if something goes wrong and "you don't have water, you don't have a reaction."

Brown said the amount of nuclear material required to fuel the reactors has less radioactivity than the cobalt therapy unit at Saskatoon's University Hospital.

"The whole core is not quite as big as a wastepaper basket and smaller than a five-gallon can."

Dimitriw said the Slowpoke concept is "unique in the world" and is attracting a lot of interest.

Research Division Sales Targets

Toronto THE GLOBE AND MAIL in English 24 Jan 86 p B13

[Article by Ritchie Gage]

[Text] The Mulroney Government's emphasis on a commercial orientation for Crown companies has prompted some ambitious plans for the 40-year-old research division of Atomic Energy of Canada Ltd.

The elite R & D operation gets up to $200-million annually from Ottawa; in five years that will be cut by 50 per cent. In its new three-year business plan, management of the research company has set sales targets for technological services at triple the current $30-million annually, to offset this reduction.

Other AECL divisions already pay their own way. Medical and food sterilization technology and diagnostic products are produced at an operation in Kanata, Ont. The Candu reactor division, based in Toronto, has made 14 domestic sales. Foreign buyers include Argentina, Romania and Korea; negotiations are under way with Turkey for a sale of the $1-billion system.

It came as no surprise to the PhD-rich research operation to see Ottawa bring out the scissors. For the past six months, the division — the original AECL company — has undergone widespread restructuring that included creation of the position of president. Two multimillion-dollar nuclear reactors have been mothballed. Management ranks have been thinned and 190 jobs eliminated through retirement incentives.

The new president is 53-year-old Stan Hatcher of Toronto, who takes over officially on Feb. 1. He was instrumental in the division's reoganization.

Mr. Hatcher, former marketing director for Candu sales, has a doctorate in chemical engineering. He has been with AECL for 28 years, part of that time spent at the Whiteshell reactor at Pinawa, Man. He said marketing experience gained during the past five years was a factor in his being chosen.

"We're taking on a much stronger commercial and customer orientation than we ever had before," he said. His slogan for AECL's new push into the market is "excellence, relevence and value." Research must meet the needs of government and the market place.

"We're encouraging our staff to come forward with ideas on products and services as well as the general running of the company," he said. Bidding on contracts for water analysis, nuclear safety training and solvent extraction research have all been prompted by staff suggestions.

A major commercial venture is developing the Slowpoke reactor design for use in space heating. Construction of a system is under way at Pinawa and it is scheduled to be operating by September. Mr. Hatcher said China has shown interest in Slowpoke because it can provide heat and electricity for remote communities of up to 2,000 people more cheaply than diesel generators.

In May, without fanfare, the two nuclear power reactor programs came to an end — one at Whiteshell, the other at Chalk River, Ont.

The showcase Pinawa reactor was mothballed to save operating costs of $9-million a year. Since 1965 it had been testing uranium fuels, using oil as an experimental cooling fluid.

It wasn't a commercial success — no system was ever sold. However, AECL still contends it's a viable system for the petroleum industry because it produces extremely high temperature steam that can be used for extraction in tar sands. (Mr. Hatcher said it wasn't known when the oil-cooled test reactor was built that heavy water reactors work as well as they do.)

A conventional water-cooled reactor at Chalk River was also shut down. It had been operating since 1947.

As far as its new sales effort is concerned, Mr. Hatcher emphasized, AECL is in the power utility, not the consumer products, business. "We've a number of people travelling the world meeting with potential customers promoting our expertise.

"Personal contact is our major sales route."

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CSO: 5120/30

COMPLETION OF PICKERING NUCLEAR STATION ANNOUNCED

Toronto THE TORONTO STAR in English 24 Jan 86 p A16

[Article by Bill Walker]

[Text] The Beatles' *Ticket To Ride* was Number 1 on the charts, Lester B. Pearson was prime minister and — yes it's true — the Toronto Maple Leafs had just won a Stanley Cup.

The year was 1965 and, on a huge clump of land along Lake Ontario west of Toronto, some construction workers began to build Ontario's first nuclear power station at Pickering.

This week, they finished. Two years behind schedule.

Hydro spokesman Michele McMaster said this week the eighth and final reactor at the Pickering Nuclear Station has begun churning out its first burst of electricity, about 17 per cent of its potential capacity.

The final reactor will be slowly brought to full capacity in the next 10 days and, when it is declared "in service," construction at Pickering will have been completed 21 years after it began.

The first large-scale nuclear power station ever built in Canada has been a controversial political issue ever since.

'Learned a lot'

The first four reactors built at Pickering (called the A station) cost Hydro $750 million in actual dollars adjusted for inflation. The cost of the second four (the B station) escalated to $3 billion.

"We've learned a lot over the years but one thing it's continued to tell us is that the Candu (reactor) design is a good design for a reactor to be used for commercial operation," Hydro executive vice-president Pat Campbell said.

"We've also learned that it's a good design to be able to run at a high capacity factor," he said, referring to the reactors' average performance at 90 per cent of capacity.

Hydro's safety statistics are world-class and Campbell said he feels public opinion is turning in favor of Hydro's nuclear operations after years of persistent criticism.

"People have become more comfortable with what we're doing based on our safety records and the fact that they know our staff is well-trained and that we tell them everything that's going on inside that plant," Campbell said.

Kate Sutherland of Energy Probe, an anti-nuclear lobby group, points to polls that show people are still skeptical about the attractiveness of the nuclear power option and are concerned about costs and long-term problems with storage of nuclear waste.

Tubes ruptured

There have been heartaches for Canada's nuclear pioneers.

The first two Pickering reactors were fitted with pressure tubes (containing nuclear fuel) constructed of Zircalloy-2, a metal that proved to be substandard. Later reactors were made with tougher zirconium niobium tubing.

Two years ago, one of the old-style pressure tubes ruptured in the second reactor at Pickering, causing the most serious malfunction Hydro has faced.

Radiation was contained and there was no public danger in the accident but, as a safety precaution, Hydro shut down the two oldest reactors for three years to perform a massive overhaul and replace all 360 tubes in each with the stronger metal.

"We're pretty darn confident that it (zirconium niobium) is the right metal to have in these pressure tubes," Cammbell said. "The other tubes were just not as effective. They couldn't withstand the constant pressure and radiation."

Having the two reactors shut down costs Hydro up to $500 000 each day in replacement power costs, either through coal-fired power or imported power.

The first reactor is scheduled to restart in November of this year and the second in February, 1987, McMaster said.

In the meantime, Hydro faces perhaps its toughest political challenge — the $11 billion Darlington nuclear station outside Oshawa scheduled for completion in the mid-1990s.

Two in question

A legislative committee at Queen's Park is studying whether power from Darlington will be needed in the face of slumping demand. It appears two of Darlington's four reactors will be completed, but the other two are in question.

(Hydro also operates the Bruce Nuclear Generating Station near Kincardine, which is close to completion.)

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CANADA

'PEOPLE'S INQUIRY' HELD ON NANOOSE BAY TEST RANGE

Ottawa THE CITIZEN in English 20 Jan 86 p C16

[Text]

NANAIMO, B.C. (CP) — Concerned citizens discussed potential nuclear accidents and Canadian sovereignty at a weekend conference but are frustrated over lack of information on a nearby weapons testing range used by the United States Navy.

The 500 participants at a "people's inquiry" on the Canadian Forces Maritime Experimental Testing Range off Nanoose Bay, 20 kilometres north of this Vancouver Island city, heard experts talk about the risk of radiation from the visits of nuclear-powered U.S. submarines and warships.

They heard peace activists urge that a Canadian-U.S. agreement that allows the visits of such vessels, which could be carrying nuclear weapons, not be renewed when it expires April 14. Some argued it amounts to an infringement of Canadian sovereignty.

Dr. Dorothy Goresky, national president of Physicians for Social Responsibility, told the conference in vivid detail the catastrophic effects a nuclear blast would have on people.

"There is no possible medical response to a nuclear war," she said.

And former military personnel and weapons researchers spoke about the range of anti-submarine weapons currently available, the ones that might be tested at Nanoose and their significance in the global arms race.

Little specific information, however, is available about the Nanoose range itself.

The Department of National Defence, the Conservative and Liberal parties and the local chamber of commerce declined to attend the meeting.

The department did send a background paper which provided a history and general description of the base but did not elaborate on such matters as radiation levels and safety monitoring, the health risks posed to residents and the environment and the potential for accidents involving nuclear reactors or weapons.

"One of the issues that has come out very clearly is that we don't know a lot of things that we as citizens should know," said Terry Padgham, one of the panelists invited by the organizer, Gabriola Island Peace Association.

Dr. Robert Woollard, a University of British Columbia assistant professor specializing in the hazards of low-level radiation, said the government's refusal to attend indicates it thinks public assessment is irrelevant.

He said there is no significant health hazard from exposure to low level radiation in the periodic visits to Nanoose Bay by nuclear-powered submarines as long as the military has been totally accurate in its description of such visits. But, he said, there is no civilian access to all the data.

"Considering the military, economic and political stakes involved, it would be an act of extreme naivety to believe that data confirming a significant health hazard of low level radiation would be released to the public," Woollard said.

Retired Lt. Col. Woody Coward, representing Veterans for Multilateral Nuclear Disarmament, said the "information vacuum" about what goes on at the Nanoose range is creating "all kinds of suppositions" which undermine confidence in the government.

Military policy is neither to confirm nor deny the presence of nuclear weapons on visiting American vessels.

Under the current 10-year agreement, Canada and the United States have equal share of testing time on the range but the Americans buy time unused by Canada.

Weapons tested are mainly torpedoes and other anti-submarine devices. Military spokesmen have previously denied that the guidance system for the Tomahawk sea-launched cruise missile was tested as well.

Different groups at the meeting were divided on how far disarmament should go.

Coward's group and the B.C. Federation of Labor call for nuclear disarmament by all sides but argue that the Nanoose range should be retained by the Canadian armed forces for conventional weapons testing. Other groups want the range converted for peaceful activities like oyster and fish farming.

Coward said the agreement should be renewed only if the United States agrees to allow verification that its ships entering Nanoose carry no nuclear arms. He said his group is realistic in believing that Utopia cannot be achieved right away.

There was sharp disagreement from panelist Rosalie Bertell, a bio-statistician and a nun. "It is this kind of false realism that has got us into this problem," she said.

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CSO: 5120/30

BERLIN CONFERENCE ON NUCLEAR EXPORTS ENDS

LD132230 East Berlin ADN International Service in German 1748 GMT 13 Feb 86

[Text] Berlin, 13 Feb (ADN) -- A 2-day session of socialist countries that are exporters of nuclear materials, nuclear equipment, and technologies ended in Berlin on Thursday [13 February].

The participants in the session stressed that the implementation of the comprehensive program contained in the 15 January 1986 statement by Mikhail Gorbachev, general secretary of the CPSU Central Committee, for the complete elimination of nuclear weapons in the event of a simultaneous ban on offensive space weapons would result in a fundamental improvement of the international situation by eliminating the danger of nuclear war and strengthening peace on earth.

The conference discussed a broad range of problems connected with the further strengthening of the international system for the nonproliferation of nuclear weapons.

Praising the positive results of the third review conference on the application of the nuclear nonproliferation treaty the participants at the session supported the speediest possible realization of the decisions and recommendations of that conference which are aimed at banning nuclear weapons tests and consolidating the international system for the nonproliferation of nuclear weapons.

On this matter, special attention was devoted to discussing measures to strengthen controls on nuclear exports. The participants spoke in favour of a comprehensive development of international cooperation in the peaceful utilization of nuclear energy and stressed the great importance of strict adherence by all parties to the obligations derived from the nuclear nonproliferation treaty and other international agreements.

The participants at the session also expressed support for the activity of the International Atomic Energy Agency to safeguard the system of nuclear nonproliferation and supported a further increase in that organization's role in safeguarding controls, especially in the states not in possession of nuclear weapons.

The delegation leaders were received by Dr Herbert Krolikowski, secretary of state and first deputy minister of foreign affairs.

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CSO: 5100/3020

POWER ENGINEERING MINISTER DISCUSSES POWER SUPPLY

AU101357 Sofia BTA in English 1048 GMT 10 Feb 86

[Text] Sofia, February 10 (BTA)--In a number of indices in the field of power engineering Bulgaria ranks among the most advanced industrial countries in the world, Mr Nikola Todoriev, minister of power engineering said. In an article published today in RABOTNICHESKO DELO he notes that the consumption of electric power per capita of the population is more than 2.5 times higher than the world's average. The minister stressed the following fact: The structure of power generation contains the characteristic features of the most progressive tendencies in this field which find expression in the great relative share of the nuclear capacities in power generation and in the great amount of electricity generated from low calory fuel.

Mr Nikola Todoriev pointed out that today the nuclear capacities generate about one-third of the electric power in Bulgaria. There are four 440 megawatt reactors at the Kozloduy nuclear power station. Yet another two reactors, 1,000 megawatts each, are now under construction at accelerated rates at the same power station. The construction of a second nuclear-power station has started near the town of Belene (on the Danube). The minister of power engineering stressed that Bulgaria is the second country in the socialist community after the Soviet Union in which 1,000 megawatt nuclear reactors are under construction. Bulgaria's experience as regards the terms of the setting on stream of the nuclear capacities and as regards the terms of their mastering places her among the most advanced countries in the world. The minister cites an interesting fact: If the average coefficiency of the utilization of the nuclear reactors in the world is 62 at the Kozloduy nuclear power station it is 80 percent.

Mr Nikola Todoriev writes that it has been provided for the development of a new trend in nuclear power generation-central heating on the basis of nuclear sources.

The minister said that 30 years ago the most powerful energy blocks were 25 megawatts. Now the power engineering system in this country includes six energy blocks, 150 megawatts each and 15 energy blocks, 210 megawatts each. The "Varna" thermo-electric power station has a capacity of 1,260 megawatts and the "Maritsa-Izstok" complex generates 20 percent of the electric power in Bulgaria. At "Maritsa-Izstok" there have been introduced efficient technologies for the direct burning of low-caloric coal in thermo-electric power stations.

Bulgaria's minister of power engineering dwells on the mining of coal in this country. Eighty percent of the coal in this country is mined in open cast mines. In the following few years 87 percent of the coal will be mined according to this method. At the same time the necessary attention is being paid to the mining of brown and other types of coal. These types of coal are mined underground.

Mr Nikola Todoriev also dwelled on some unresolved problems in the field of power engineering. Bulgaria is still lagging behind in a trend as important as the rational use of fuels and energy and the raising of the energy efficiency of the economy. The consumption of fuels and energy per unit of production in this country is still high.

By way of conclusion the Bulgarian minister of power engineering comments on last year's difficulties in power supply. He stressed that the state is providing the necessary resources with which to compensate the lack of water resources for achieving the energy balance and that the disturbances will be gradually overcome.

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CSO: 5100/3019

INNOVATIONS AT KOZLODUY NUCLEAR POWER STATION

AU061251 Sofia RABOTNICHESKO DELO in Bulgarian 5 Feb 86 p 1, 3

[Undated RABOTNICHESKO DELO Nevena Markova report from Kozloduy, in the framework of the national competition "Research--Application in Practice--World Level," entitled: "The 'Nuclear Megawatts' of Innovation"]

[Text] A program collective from the Kozloduy Nuclear Power Combine has developed and applied a new method for reloading the "VVER-440" reactors. The collective consists of the physicist Rangel Simov; Radka Milanova, candidate of technical sciences and senior scientific worker grade I; and the physicists Nikola Alekov and Tsveta Kharalampieva, under the leadership of Eng. Georgi Dichev, hero of Socialist Labor and chief director of the combine. Practice has confirmed the effect of prolonging the duration of the reactors' operating cycles and of reducing the radiation loading of their housings.

Now that the idea has been implemented, its inventors are eager to discover new reserve in the nuclear production of electric power and to seek new ways and means of achieving higher efficiency.

"Following the successful introduction of our development, we extended the period of operation of the reactor and achieved more complete combustion of the nuclear fuel. We applied the new method for the first time in 1984, during the overhaul and reloading with fresh fuel of Units 2 and 3 of the nuclear plant. The economic effect achieved amounted to 20,440,000 leva," noted Engineer Dichev, the leader of the program collective.

The idea of applying a new method for recharging with nuclear fuel, protected by Authorship Certificate No 36,609, came during the second recharging of Unit 2. After nights of hard work in the computer center the forecast results were confirmed. In 1981 a model version of the fuel cycle for charging and recharging "VVER-440" reactors was successfully worked out. The program collective successfully applied the developed location of the nuclear fuel in the reactors' active zones. In 1984 Units 2 and 3 were loaded by this method, and in 1984 Unit 4 was so loaded. Before the end of the year, the method will also be applied to Unit 1.

When the development is applied to all reactors, the economic effect will amount to more than 40 million leva.

A task for tomorrow is the commissioning of a fifth power unit at the Kozloduy nuclear power station, with a capacity of 1,000 megawatts. Still to be mastered is a complex of programs for analyzing the complex processes taking place in the active zone of the 1,000 megawatt reactor and for opening up the reserves for efficient utilization of the nuclear fuel.

The members of the program collective well realize that what they have achieved is not the limit of the technical possibilities, and that the intelligence, labor, talent, and daring they have invested will continue to be applied at a high level in the future.

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CSO: 5100/3019

BRIEFS

LITHIUM CARBONATE MINING INSTALLATION--(DYN)--Salta--The construction of the first lithium carbonate mining installation will begin here on February 14 according to official sources yesterday. Lithium carbonate can be used in nuclear reactors and eight million dollars will be invested in the construction. The investors will benefit from the provincial mining law which allows special concessions for investment capital. According to the owners of the new company production will begin in 1987 and alloys of aluminium, enamel, magnesium, potassium, sodium sulfate, sodium chloride, boric acid and lubricants will also be produced. [Text] [Buenos Aires BUENOS AIRES HERALD in English 25 Jan 86 p 3 PY] /6091

CSO: 5100/2043

INDIA

COMMENTARY ON NONALIGNED VIEW OF NUCLEAR TESTING

BK201423 Delhi General Overseas Service in English 1340 GMT 20 Jan 86

[Commentary by political commentator Desu Krishnamurti entitled "NAM [Nonaligned Movement] Proposals on Nuclear Test"]

[Text] The latest Soviet gesture in accepting a nonaligned proposal to ban nuclear weapons tests not only in the atmosphere, outer space, and underwater but also underground, may not sound very significant in the wleter of proposals and counterproposals flying between Moscow and Washington in the interest of peace and disarmament. The Soviet Union has also extended its unilaterly test freeze by another 3 months. But neither India nor the Nonaligned Movement, of which it is still the chairman, is likely to underestimate the value of such an acceptance by Soviet General Secretary Mikhail Gorbachev. The nonaligned states are unanimous in the view that each step taken toward disarmament could provide new funds to increase the quality of living in the developing world.

The history of nonaligned initiatives in regard to disarmament apart, one of the very first things that Mr Rajiv Gandhi did as India's young prime minister, was to give a new thrust to the Nonaligned Movement as the biggest peace movement in the world. The latest 3 months saw stepped up campaigns by Mr Gandhi in the cause of disarmament. Those efforts were in the context of the declaration of the nonaligned foreign ministers at Luanda in September on the urgent need for moratorium on nuclear tests. On his return trip from Nassau summit, Mr Rajiv Gandhi visited the Hague on the eve of the installation of cruise missiles in the Netherlands and later made an unscheduled halt at Moscow to hold wide ranging talks with Mr Mikhail Gorbachev on global issues, particularly disarmament.

With the Geneva summit only a few weeks away then, it was widely believed at that time that consultations between the Soviet and Indian leaders would be very useful because Mr Rajiv Gandhi had met Mr Ronald Reagan just a couple of days before and had acquired an insight into the U.S. President's thinking on the issues that would figure at Geneva. Three weeks after this meeting with Mr Gorbachev came the major six-nation nonaligned initiative on nuclear tests. They proposed a 12-month moratorium, offering to monitor all underground tests by installing sensitive devices on test sites of the superpowers to insure its strict observance.

Previous proposal for a nuclear weapon test freeze fell through because of an effective and mutually acceptable way of verifying of such a freeze could not be found by the superpowers. This initiative was a followup of the summit meeting of the six nations held in New Delhi around this time last year. While the Soviet Union had already announced a unilateral test freeze til January 86, the Americans maintained that such a moratorium was not possible because it could not be monitored.

The six-nation Delhi delcaration had said, and I quote: "The problems of verifying the suspension we propose are difficult but not insurmountable. Third party verifications could provide a high degree of certainty that testing programs have ceased. We propose to establish verification mechanisms on our territories to achieve this objective." When the move was first made in May 1984, it generated a lot of enthusiasm and was blessed by the pope. Nearly 150 congressmen and senators met President Reagan in support of it. The impact of the six-nation Delhi declaration in January last was even greater.

But the latest nonaligned initiative coming soon after Nassau and just before Geneva was no surprise. Moscow has already formally committed itself to stop all tests unilaterally for almost 5 months ending 1 January 1986 and for as long thereafter as the United States refrain from testing. Predictably, Mr Gorbachev's latest offer is only a reaffirmation of Moscow's earlier pledge. It now extends this test moratorium by another 3 months.

The new and serious overtures from Moscow about halting, which are exactly reversing the arms race, must evoke a matching response from Washington. A test ban treaty is long overdue and would be a historic step forward to brighten the prospects of nuclear disarmament. The conclusion of a comprehensive treaty could add to the pressure on France and China who have carried atmospheric tests alread.

More recently, Moscow reiterated Gorbachev's commitment to no testings of nuclear weapons and his willingness to carry out mutual reductions up to 50 percent in the superpower arsenals. Washington still adheres to its no testings doctrine. Just now the Kremlin offer is conditional till it is close to a permanent commitment because it is continually being extended. President Reagan will do well to make a beginning by accepting the Soviet offer, and if he so desires, put to test the substance of Soviet offers.

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CSO: 5150/0062

PAPERS REPORT DELHI MEETING OF PALME COMMISSION

Appeal From FRG Member

Bombay THE TIMES OF INDIA in English 18 Jan 86 p 14

[Text] New Delhi, January 17: Mr. Egon Bahr, West German M.P. and disarmament expert, yesterday expressed his scepticism about nuclear powers going as far as to rid the world of all nuclear weapons. However, if further deployment and development of nuclear weapons was stopped, it would be a major step for all mankind, he said.

Mr. Bahr, who is a member of the Palme commission, was asked to comment on the latest Gorbachov proposals in which he outlined a step-by-step programme to rid the earth of all nuclear weapons before the end of the century.

Mr. Bahr and Mr. K. Subrahmanyam, director of the Institute for Defence Studies and Analyses, addressed a joint press conference before Mr. Bahr delivered a lecture on "Strategic defence initiative and perspectives for arms control: European and German viewpoints."

Mr. Bahr, who is carrying a message for the Prime Minister, Mr. Rajiv Gandhi, from Mr. Willy Brandt, chairman of the Social Democratic Party, met the vice-president, Mr. R. Venkataraman, today. He also had talks with the industry minister, Mr. N. D. Tiwari, the minister of state for defence research and development, Mr. Arun Singh, and the minister of state for external affairs, Mr. K. R. Narayanan.

On the Gorbachov proposals, Mr. Bahr said he would like to have details and the reaction of the other nuclear super powers. A fact remained that the world had experienced technical development much faster than the capacity of politics to govern it, he said.

PTI adds: The minister of state for external affairs, Mr. K. R. Narayanan, said on Friday that India considered nuclear disarmament central to the issue of international peace and security and called for mobilising world public opinion against nuclear weapons.

Statement Presented

Madras THE HINDU in English 20 Jan 86 p 9

[Text] New Delhi, Jan. 19. The Independent Commission on Disarmament and Security Issues, better known as the Palme Commission, has appealed to the superpowers "not to miss the unique opportunity" created by the "far-reaching and constructive" proposals put forward by the Soviet leader Mr. Mikhail Gorbachev and take "concrete measures to halt the arms race."

The Commission ended its three-day deliberations here today.

Presenting the ICDSI's Delhi statement and later addressing a press conference here today, the Swedish Prime Minister, and Chairman of the Commission, Mr. Olof Palme said the proposals came very close to the U.S. "zero-option proposal" on dismantling intermediate range missiles in Europe.

"Therefore, what had been uppermost in our minds in this conference was that the resumed dialogue between the Soviet Union and the U.S. must come to an early concrete agreement," he said.

First step: Mr. Palme pointed out that on behalf of the six nations which were signatories to the Delhi declaration, the Prime Minister, Mr. Rajiv Gandhi, had in October last offered to help the major powers in establishing verification procedures. The Gorbachev proposals had now opened up the possibility for this. A mutually verifiable and comprehensive test ban agreement could be the first "confidence-building" step in the new round of disarmament talks, Mr. Palme said.

On strengthening the Non-Proliferation Treaty, (NPT) Mr. Palme admitted that there was a difference of opinion between the Indian and the Commission's views. He had told the major nuclear weapon States many times that by continuing with vertical proliferation they were violating Article 6 of the treaty. But this did not mean that NPT was a scrap of paper--instead he urged all nations to sign it.

UN's role: The Commission made some specific recommendations to enhance the UN's peace-keeping role. They included a more comprehensive and regular procedure in the Security Council to monitor the international security situation: stronger and more practical support including financial, for UN peace-keeping operations and early handling of disputes and potential conflicts.

Mr. Palme said although the UN in the 40 years of its existence had had as many successes as setbacks, it was the only "universal instrument of peace and international cooperation." The UN should strengthen and develop peace-keeping techniques which have potential applications in fields other than the purly political, namely international terrorism and natural disasters.

Regional security: The other major focus of the Delhi discussions, Mr. Palme said, was regional security. The Commission felt that the countries that enter into regional security arrangements should make greater use of UN peace-keeping mechanisms to stabilise volatile situations which threaten to deteriorate into armed conflict.

The Commission welcomed the encouraging initial proposals to reduce potential conflicts between the South Asian Association for Regional Cooperation (SAARC) member nations. It said the Contardora peace process in Latin America and the actions of Asian enhance the prospects of common security.

Mandatory sanctions: One area which the Commission felt required "urgent and intensified international effort" was on South Africa. Nothing short of mandatory sanctions against the Pretoria regime could help weaken apartheid, Mr. Palme said.

In this context, the Commission welcomed the regional cooperation among the countries of South Africa Development Coordination Conference (SADCC) and said it helped the economies of frontline States survive the continual aggression of the South African armed forces. It appealed to the international community to give it much more support.

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CSO: 5150/0064

VICE PRESIDENT CALLS FOR REDUCTION IN NUCLEAR ARMS

Calcutta THE TELEGRAPH in English 7 Jan 86 p 4

[Excerpts] New Delhi, 6 Jan (PTI)--The vice-president, Mr R. Venkataraman, today called for a moratorium on stockpiling of nuclear arms and militarisation of outer space.

Inaugurating the eighth Commonwealth Conference of Speakers and Presiding Officers here, Mr Venkataraman stressed the need for strengthening the Commonwealth in order to promote world peace and the parliamentary system of government.

Welcoming delegates from 26 Commonwealth countries and members of the Indian Parliament and ministers who attended the inaugural session at the Central Hall of Parliament House here, Mr Venkataraman emphasised the need for the Commonwealth to remain together in achieving the ideal of world unity and cooperation.

Pointing out that the Commonwealth presented the third largest group of nations in the world after the United Nations and the nonaligned movement, Mr Venkataraman said, "It is not easy to establish peace and harmony today in a world that is riven with conflicts and strife. And yet, the endeavour must go on ceaselessly for the peace and progress of humanity," he added.

In his speech, Mr Venkataraman emphasised the need for a determined endeavour to bridge the widening gap between the developed and the developing countries in providing basic necessities of life to the people, but expressed his unhappiness that the creations of science and technology were "posing a danger to life on our planet."

He said: "More than 50,000 nuclear warheads, capable of destroying mankind from the face of earth several times over, are stockpiled in the arsenals of the nuclear weapon states. The development of new weapon systems is bound to lead to a further escalation of the nuclear arms race and enhance the danger of the outbreak of a nuclear war."

Stating that the global military expenditure has emerged as a major factor responsible for the structural malfunctioning of the world economy, Mr Venkataraman said, "We have, therefore, to urge upon the nuclear weapon states to make every effort to reach an agreement on substantial reductions in their stockpiles of nuclear warheads."

Indian Electorate 'Mature'

"No person or party can take the Indian electorate for granted nor predict their behaviour," Mr Venkataraman said, adding that election results have "demonstrated unmistakably their (electorate's) ability to choose a government for themselves."

The elections have also proved the people's "maturity to call parties and governments to account at the time of each general election," he added. "This is a sign of maturity and wisdom," he said.

Mr Venkataraman told the conference that adult franchise has created amongst the people of India a renewed awareness of their right to shape their destiny. He said he was also proud that the country had retained and successfully worked the party system of elections and government.

He told them that India has not only the largest democracy, but also "one of the healthiest and most vibrant democracies in the world." Mr Venkataraman said Parliament was a growing and constantly evolving institution. As the ministers are responsible to Parliament, it is necessary that Parliament and its members remain responsible to the people. "And this accountability is continuous, concurrent and not merely periodical," he added.

In his 22-page address, Mr Venkataraman pointed out that another regrettable feature of our time was the practice by some states of racial discrimination, depriving human beings of their legitimate political and social rights.

'Colonial Era Over'

The sovereign states of Australia and Zimbabwe represented the "A to Z" of the process of dismantling of the British Empire over which the sun was not supposed to set, Mr Venkataraman said.

But this was now part of history, and today "nations widely different in history, culture and tradition, in size and economic status, stand knitted together as a brotherhood born out of our colonial past. Within the Commonwealth, there are a great many features in our political systems which make every one of our countries unique."

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CSO: 5150/0063

INDIA

SOVIET STAND ON INDO-PAKISTAN NUCLEAR ARGUMENT SCORED

Bombay THE TIMES OF INDIA in English 28 Dec 85 p 8

[Editorial]

[Text] Guess where the following quotation comes from: "Instead of getting dragged into a nuclear arms race against Pakistan (sic). India should stand firmly by its policy of opposing all nuclear arms proliferation both horizontally and vertically. Any attempt by India to produce nuclear weapons will not act as a deterrent to Pakistan or bring additional security to India. It will only aggravate tension and create apprehension in the minds (sic) of neighbouring countries." No one can blame you if your first guess is that it comes from some U.S. text, official or non-official. Also, no one can blame you if your second guess is that the quotation comes from some article or statement by some peace group in India or elsewhere. But both guesses are wrong. The quotation is contained in the CPI's draft political resolution which is to be endorsed at the forthcoming party congress next March.

The resolution is naive in the extreme. It ignores the reality of Pakistan's nuclear weapons programme and the challenge that must pose to India; it is truly extraordinary for anyone to believe that India's opposition to nuclear proliferation. however strongly reaffirmed, will dissuade Islamabad from going ahead with its plans; and one must live on another planet to think that nuclear weapons do not act as a deterrent to those who are, or might soon be, in possession of them. These may not give India an offensive advantage in that New Delhi cannot possibly think of attacking Pakistan on the strength of its nuclear arsenal if it acquires one. But surely they must deter Pakistan. And when did the CPI start bothering about the reaction of neighbouring countries which it till quite recently believed were open to "U.S. imperialist" manipulation and control?

We would not make the mistake of treating the CPI as a Soviet megaphone. It is not our case that the party leadership has acted on a cue from Moscow. For all we know, it is a mere coincidence that the CPI takes the same position on the issue of non-proliferation, including a possible Indian response in kind to a Pakistani bomb, as the Soviet Union. Even so, it is an interesting coincidence or convergence, and it detracts strongly from the "nationalist" position the CPI has tended to take on issues such as investment in India by multinationals, the Indian effort to get sophisticated technology from the United States and so on.

The CPI leadership cannot be wholly insensitive to the Indian need to be seen to be stronger than Pakistan in the military field in the interest of peace in South Asia; nor can it be oblivious to the fact that this would not be possible once Islamabad comes to possess the bomb and New Delhi does not. This must be even more true of Soviet policy makers. After all, their country has lived in great fear when its arch rival, the United States, possessed the bomb and it did not. Stalin was perhaps a mad man who ignored the apprehensions that a Soviet nuclear arsenal would provoke in western Europe. But to the best of our knowledge, all subsequent Soviet leaders have been keen to ensure that their country did not lag behind the United States in this regard. Unless we are sadly mistaken, Mr. Gorbachov too is worried over President Reagan's "star wars" programme precisely for the same reason.

The logic behind the Soviet opposition to an Indian response in kind to a Pakistani bomb is rather strange. Moscow is not a co-guarantor of the existing world order with Washington. The United States can concede it such a role only if it openly agrees to respect the *status quo* and to accept a second place in the power hierarchy. It is sheer arrogance on the part of Soviet leaders to argue that their position vis-a-vis the United States is quantitatively different from any other country's vis-a-vis any other. They have used this kind of argument in respect of their efforts to secure access to western technology and they are doing so on the nuclear issue. And it has perhaps not even occurred to them that Indo-Soviet friendship has been contingent on a certain Indian perception of Pakistan and that in the event of an Indo-Pakistan *rapprochement*, Indo-Soviet ties could shrink. But Soviet naivety would be understandable on the assumption that they are as ignorant as they are self-righteous. The same explanation cannot be offered in respect of CPI leaders. They baffle us as they must baffle others, including the CPM leaders who have adopted a more cautious approach on the nuclear issue. They have said that they would not close the country's option.

/9274
CSO: 5150/0061

URANIUM CORPORATION REPORTS RECORD PRODUCTION IN 1985

Calcutta THE TELEGRAPH in English 26 Dec 85 p 4

[Text]

New Delhi, Dec 25: The Uranium Corporation of India Limited, Jaduguda, has achieved an all time record production of uranium concentrates during 1984-85. The capacity utilisation of the mine was 88.96 per cent this year as against 84.57 per cent last year.

Similarly, the capacity utilisation of the mill with regard to the processed ore was also higher during 1984-85 at 97.86 per cent as against 92.77 per cent last year. The overall recovery of the ore was also higher, an official announcement said here today.

While the production of uranium mineral concentrates at the Rakha uranium recovery plant was above the target, the production at Surda and Mosaboni plants was marginally less than the target because of erratic power supply.

In respect of by-products, the production of molybdenum concentrate exceeded the target by nearly 17 per cent. The production of copper concentrate and magnetite also exceeded target.

The corporation achieved its highest ever income at Rs 14.87 crores.

Various programmes have been taken up for increasing the production of uranium. Some of the ongoing projects are: setting up of a uranium recovery plant adjacent to the copper concentrator of Hindustan Copper Limited at Mosaboni, construction of a mine at Bhatin, and expansion of the mill at Jaduguda at a cost of Rs 3.29 crores.

Project reports for the Narwapahar and Turamdih projects involving an expenditure of over Rs 213.20 crores have been submitted to the government for approval. The project report for sinking an underground shaft required for mining ore located at depths of 555 metres and below has also been submitted for the government's approval.

To meet the increased uranium requirement for the country's nuclear power programme, the major thrust is on improvement of uranium recovery from copper tailings. Tests being conducted in collaboration with the ore dressing section of BARC are likely to be completed very soon. Based on the results of these tests, modifications will be made at all the three plants, at Surda, Rakha, and Mosaboni.

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CSO: 5150/0060

IMPORTANCE, PLANS OF ORISSA SANDS COMPLEX NOTED

Calcutta THE TELEGRAPH in English 27 Dec 85 p 6

[Text]

Chhatrapur (Orissa), Dec. 26 (PTI): The Orissa Sands Complex (OSCM) of Indian Rare Earths Limited near here, is expected to play a significant role in achieving the country's targetted 10,000 MW of nuclear power generation by the turn of the century with the stage set for launching of its Rs 20-crore second phase.

The foreshore mineral deposits in beach sands in Orissa contains adequate concentration of thorium which can provide strategic nuclear fuel for the fast breeder reactors, according to the scientists of Indian Rare Earths (IRE) here.

With the completion of the second phase, the project would concentrate on production of rare earth compounds like thorium nitrate from the mineral, monozite, being the catalyst for production of nuclear fuel.

The Rs 100-crore first phase of the complex was completed earlier.

The second phase comprises a rare earth chemical plant, electro-smelting plant and ancillary industries like sponge iron plant, silica and refactory plant and caustic plant.

The IRE has also set up a research and development centre for advanced research in nuclear fuel technology in collaboration with the atomic energy commission which will coordinate the works of a scientists' pool created for this purpose.

For the first time in the world, the fast breeder test reactor developed by Indian scientists, directly put on practical application from theoratical analysis in the absence of empirical studies, the scientists said.

Oxide of uranium and plutonium, containing 15 to 30 per cent plutonium, is generally used as fuel in the fast breeder reactors. But for the first time for the fast breeder, mixed carbide and nitrates were used by Indian scientists because of its higher thermal conductivity and density, scientists said.

The success of the experiment has led them to believe that the development of U-233 fuel thorium cycle, is not faraway, they added.

The OSCM is designed to produce 2,20,000 tonnes of ilmentie, 30,000 tonnes of sellimenite, 10,000 tonnes of rutile and about 4,000 tonnes of monazite.

It will mine about three million tonnes' of raw sand per annum. The entire output of ilmentie will be utilised to produce synthetic rutile, a semi-finished product having global demand.

The first consigment of synthetic rutile worth Rs 25 lakhs has been exported to Japan few months ago.

Keeping in view the vast export potential of this material the Orissa government has constructed a minor port at Gopalpur with an investment of Rs 20 crores. The port is expected to operate before October next year. Meanwhile, an eight-kilometre-long railway siding has also been completed, linking OSCM with Chhatrapur.

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CSO: 5150/0059

INDIA RARE EARTHS BURIES URANIUM, ENDANGERS NEIGHBORS

Calcutta THE TELEGRAPH in English 20 Jan 86 p 5

[Text]

New Delhi, Jan. 19: Six hundred tonnes of radioactive uranium and mesothorium lie buried in the Alleppey premises of Indian Rare Earths Limited (IREL) at a great risk to the human and animal population in the vicinity, according to a study conducted by the Kerala-based forum for occupational health and environmental studies (FOES).

The wastes, which will remain lethal for centuries, are buried close to the banks of the Periyar river and threaten to enter the local food chain. Another 5,000 tonnes of thorium powder are stored in a broken silo two metres from the river bank, threatening the water system of the entire Ernakulam district.

The FOES team consisted of experts from the Medical College, Calicut, Government Law College, Ernakulam, and the Jawaharlal Nehru University, New Delhi. The study was coordinated by Mr V.T Padmanabhan, a well-known environmentalist, and the findings were released earlier this month by Justice V.K. Krishna Iyer.

IREL functions under the department of atomic energy (DAE). The study challenges the claims of the atomic energy commission that India's nuclear programme is safe, pointing out that while the nuclear programme has reached a take-off stage with breeder reactors going critical, the plant which products the vital fuel, thorium, has primitive safety apparatuses.

The study found widespread incidence of cancer and sterility among workers at the plant as well as genetic disorders among their offspring. Heart diseases and premature ageing were other occupational hazards. It said the cause-effect relationship between radiation and these diseases had been established by an epidemiological study in which the health condition of exposed workers was compared with that of an unexposed workers' group.

According to the study, the cancer risk among IREL workers is 4.62 times higher than that of workers in an adjoining factory and 6.98 times higher than the all-India average of workers insured under the Employees' State Insurance scheme. Similar rates were found for other diseases. As an instance of genetic disorders, the study cited the case of Karunakaran, a mechanic, all of whose four children are severely retarded mentally

The study reported that compensation had been denied in many deserving cases. It claimed to be the first study of its kind in the world for the atomic energy industry and observed that IREL, being the only DAE unit which has completed 30 years of operation, lent itself to such a comprehensive study in which hazards and risks could be quantified.

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INDIA

BRIEFS

BJP NUCLEAR POLICY--Chandigarh, Jan. 6--India does not have a nuclear bomb, Mr Atal Bihari Vajpayee, president of the BJP, told a Press conference here today before returning to Delhi after a three day visit to this city. But he said the nation should be taken into confidence about the Pakistani nuclear threat. "What is our response", he asked. He added "India does not have the bomb. It should make one. It will have to announce it". [Text] [Calcutta THE STATESMAN in English 7 Jan 86 p 9] /9274

FAST BREEDER TECHNOLOGY--Fast-breeder reactors were cited as the 'most likely candidates' to meet future requirement for power production in the country by eminent scientist, Dr Homi N Sethna, at a function in the Capital on Wednesday. The 63-year-old scientists, who received the Dadabhai Naoroji Memorial Prize for 1984 from Vice-President R. Venkataraman at the India International Centre said in course of a lecture on 'Energy For the Future' that with fossile fuel sources fast depleting, it was 'imperative' to find reliable substitutes for power production in the near future. Breeder reactors were attractive, Dr Sethna said, because they produce more fuel than they burn. Fast-breeder technology using thorium as the fertile material was of particular relevance to India because the country's thorium resources were some 360,000 tonnes, six times our uranium reserves, he noted. The fuel life thus could be stretched six times by deploying thorium in Indian fast breeders, he pointed out. Dr Sethna, who is the first scientist to receive the prestigious award consisting of Rs 10,000 and a citation, said that fast breeder technology was the potential answer to the long-term energy needs of the country. The eminent scientist, who had already been honoured with the Padma Sri, Padma Bhushan and Padma Vibhushan, receives the Dadabhai Naoroji Award for his contribution to the design and construction of the nuclear power plant at the Bhabha Atomic Research Centre. [Text] [New Delhi PATRIOT in English 16 Jan 86 p 3] /9274

CSO: 5150/0066

HOPE FOR RECONCILIATION WITH FRANCE EXPRESSED

GF091552 Islamabad THE MUSLIM in English 6 Feb 86 p 4

[Editorial: "French Nuclear Duplicity"]

[Text] The arrival in Islamabad of the French Foreign Ministry's secretary general will provide an opportunity for officials of Pakistan and France to attempt to resolve the festering bitter dispute between the two countries on the reprocessing plant. This issue, which enjoys a national consensus in Pakistan among all sections of opinion, became acrimonious as a consequence of the French Government's decision in the summer of 1978 to unilaterally succumb to American pressure and cancel an agreement, in breach of commitments given by Paris to Islamabad. Pakistan engaged a French company in October, 1974, which was followed in March, 1976 by a bialteral cooperation agreement between the two governments. A comprehensive safeguards agreement was also concluded between the International Atomic Energy Agency and Pakistan.

France, which consistently claims to uphold a policy of independence from U.S. control in the Gaullist tradition and seeks to help Third World countries, went back on its word in the case of reprocessing plant. Apart from the fact that it was a breach of contract and adversely affected French credibility and commitment in the eyes of Pakistani opinion, another additional aspect was the French decision to readily replace U.S.A. as a supplier of enriched uranium for India's Tarapur reactor. Regrettably, this again was undertaken as a result of American pressure. If the French were sceptical about Pakistan's nuclear programme, it is strange that such scepticism and suspicions were not extended to the Indian programme which is publicly developing a nuclear capability.

We would hope that with the forthcoming visit of the French mission this issue will be resolved in a way that conforms to the principles of justice and legality in inter-state relations. The reprocessing plant issue is a test case in Pakistan-France relations and it is still a festering sore within our national body politic: Hopefully, the French will endeavour to expedite its resolution so that our broader relationship can incorporate mutually beneficial cooperation in various other spheres as well.

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CSO: 5100/4735

PRIME MINISTER ADDRESSES PINSTECH ANNIVERSARY

BK101611 Karachi Domestic Service in Urdu 1500 GMT 10 Feb 86

[Text] Prime Minister Mohammad Khan Junejo has reiterated that Pakistan's nuclear program is totally peaceful and its only aim is the people's social and economic prosperity. He was addressing a function held to mark the 20th anniversary of Pakistan's Institute of Nuclear Science and Technology [PINSTECH] in Islamabad today. Mr Mohammad Khan Junejo said that the country is being administered democratically by an elected government that is accountable to the people. Basically, this government is responsible for the country's progress and prosperity and improving the general quality of life. These are our only aims and that is why it is essential that we work to achieve these policies and programs under all circumstances. He added that a self-reliant economy is our objective and without achieving success in the field of science and technology this objective would be impossible to accomplish. We can achieve this objective through nuclear technology. That is why the biggest responsibility lies with scientists, technical experts, and engineers who should fully participate in this great effort to accelerate progress in the country.

The prime minister reiterated Pakistan's stand against the use of nuclear energy for any purpose other than peaceful and said the world will continue to be unsafe until nuclear weapons are eliminated. As far as Pakistan is concerned, it has decided that it will use nuclear energy only for constructive puroses. That is why our nuclear program is totally peaceful. He expressed happiness that Pakistan's position is now being better understood.

He described the recent India-Pakistan agreement on not attacking each other's nuclear installation as a constructive effort which aims at utilizing their resources and facilities for accelerating social and economic progress in both countries. He said that Pakistan's proposal to make South Asia a nuclear-free zone had been overwhelmingly welcomed at the United Nations. The prime minister referred to the work being done on uranium in Pakistan, but emphasized that its aim is not to make a bomb but to provide fuel for the Pakistani nuclear power station. He added that all nations should know that Pakistan cannot be deprived from obtaining any type of technology needed to meet its energy needs, and for agricultural and industrial progress.

The prime minister declared a bonus equivalent to a month's salary for all employees of PINSTECH. Earlier, the chairman of the Pakistan Atomic Energy Commission, Mr Munir Ahmed Khan, described the institute's role in the field of nuclear research and said that this institute is the best of its type not only in Pakistan but in the entire Islamic world and is one of the best of its type in the Third World. Throwing light on the institutes future research projects, the chairman said the institute is working on breeder reactors, termal-nuclear fusion for nearly unrestricted energy supply, and laser technology. The institute's chairman also referred to the establishment of PINSTECH and its successes in the field of science and technology.

The function was attended by federal ministers, ministers of state, senators, members of the National Assembly and prominent scientists. The prime minister distributed awards and certificates and inspected various departments of the institute. The director and chairman of the Pakistan Atomic Energy Commission presented an insignia to the prime minister.

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CSO: 5100/4735

USSR'S PETROSYANTS ASSESSES NPT REVIEW CONFERENCE

PM221502 Moscow NEW TIMES in English No 42, Oct 85 pp 18-20

[Article by Andrey Petrosyants, chairman of the USSR State Committee for the Utilization of Atomic Energy: "Non-Proliferation -- A Path Towards Disarmament"]

[Text] The Treaty on the Non-Proliferation of Nuclear Weapons went into force in March 1970. Today some 130 states, i.e., the overwhelming majority, have signed it. The signatories have met several times to discuss its operation. In 1975 the representatives of 58 countries met in Geneva for the purpose. In 1980 the Second NPT Review Conference was held. Three main groups of states took shape at this conference - the Western countries led by the U.S.A., the non-aligned nations headed by Mexico, Yugoslavia and Sri Lanka, and the socialist states led by the U.S.S.R. Attended by 75 countries, it was held in a climate of sharp contradictions and direct confrontation between separate groups of participating countries. Although many of the signatories to the treaty proposed to make it more effective, to increase the number of participants, the political situation at that time made it impossible to adopt a comprehensive final statement. The non-aligned and neutral countries qualified some clauses of the treaty as "discriminatory" and "unfair." Nevertheless on the whole, the Second NPT Review Conference played a useful and constructive role. It set the date for the convocation of the Third Conference - 1985.

The importance the world community attaches to nuclear non-proliferation is evidenced by the fact that the Third NPT Review Conference received numerous meassages of greeting, e.g., from Javier Perez de Cuellar, U.N. Secretary-General, and Mikhail Gorbachav. "We are for energetic efforts to curb the arms race being made all along the line," the CPSU General Secretary wrote. "And, of course, an important role here will be played as before by measures designed to prevent the spread of nuclear weapons."

At the present forum, as at the previous one, the positions of the three leading groups of countries crystallized at once. The group of non-aligned, developing and neutral countries was numerically the biggest. The second group was made up of Western states led by the U.S.A. and the third, of the socialist countries. In the period since 1980 and during the first few days after the Third NPT Review Conference opened, another 17 states signed the treaty. Thus, the overwhelming majority of the U.N. member countries are now signatory to it.

The 15 years that have passed since the treaty was concluded have shown its viability and effectiveness. Since it came into force not a single state has acquired the nuclear weapon. However, there are also some disquieting facts. For instance, the number of so-called "near-nuclear" states has increased. Among these are Israel, South Africa and Pakistan which actually make no secret of their nuclear ambitions. The press has frequently carried reports of certain Western countries, the U.S.A. in particular, having actually helped meet the desire of these countries to acquire the atomic weapons.

What was the U.S. stand at the recent forum?

Let me say outright that the position of the U.S. delegation was dubious. They came without any concrete proposals as regards fulfillment of the recommendations arising from Article VI of the treaty which reads: "Each of the parties to the treaty undertakes to pursue negotiations in good faith on effective measures relating to cessation of the nuclear arms race at an early date and on a treaty on general and complete disarmament under strict and effective international control."

The U.S. delegation brought no concrete proposals nor has it done anything positive in the past five years to make non-proliferation more effective. On the contrary, without giving any reasons, Washington broke off the trilateral talks (between the U.S.S.R., the U.S.A. and Great Britain) on the drafting of a treaty on the complete and general prohibition of nuclear weapon tests and did not support any of the Soviet Union's numerous peaceful proposals.

Senator Carl Levin (Democrat) who attended the Conference in the capacity of an observer from the Senate Armed Services Committee, also confirmed that the U.S. delegation was compelled to adopt a "defensive" position.

As to the prohibition of nuclear weapon tests, the U.S. reaction on this question was to all intents and purposes negative. Yet reinforcement of the non-proliferation regime -- both "vertical" and "horizontal" -- largely depends on such a ban.

Kenneth L. Adelman, director of U.S. Arms Control and Disarmament Agency, who headed the U.S. delegation, avoided posing controversial questions, nor did he engage in confrontation or polemics. True, he did touch upon the question of the prohibition of nuclear weapons tests. But in what key?

"For our part, we remain committed to a complete ban on nuclear testing as a long-term goal," he said. "But we do not agree it should be the next step in our efforts to reduce the nuclear threat. A nuclear test ban would not reduce the number of nuclear weapons. And our most urgent task must be deep reductions of those existing nuclear arsenals."

What does Kenneth Adelman mean by "long-term goal"? One to be achieved in five, ten, fifteen or, perhaps, even more years from now? The U.S. delegation did not submit any definite proposals on a considerable reduction of the existing nuclear stockpiles either. How big should this reduction be? How soon should it be effected? What should be the procedure for its implementation? As the reader can see, the speech of the U.S. delegate contained nothing but some fine words. There was no suggestion of progress. Why would a ban on nuclear weapon tests not help reduce the nuclear weapon stockpiles? Why did hte U.S. delegation ignore such an important factor as halting of work on modernization and improvement of existing nuclear weapons, and development of new types of such weapons? Without tests it is impossible to develop a reliable weapon.

It is noteworthy that not all the Western countries supported the U.S. stand. Far from it. For instance, William Hayden, Australian Minister for Foreign Affairs, said: "We hold that a comprehensive test ban treaty is urgently required.... What is required, and required urgently, is a comprehensive nuclear test ban treaty and the necessary global means of verification of compliance with the treaty."

Lennart Bodstrom, the Swedish Foreign Minister, said:

"The Swedish government has welcomed the moratorium on all nuclear testing announced by the Soviet Union. We strongly hope that the moratorium will be prolonged beyond 1 January 1986, and that the United States together with other nuclear weapon states will join the moratorium."

I would like to quote another statement here. Ahead 'Ismat 'Abd al-Majid the Egyptian Foreign Minister, said:

"One possible way forward is a moratorium on testing until the conclusion of a CTBT. In this respect, we welcome the Soviet Union's decision to free nuclear tests from August 6 to January 1, 1986. The Soviet Union also expressed readiness to extend such a freeze if reciprocated by the U.S.A., which is what we all hope will happen."

When the U.S.S.R. announced its moratorium on nuclear explosions, many Western countries renewed their discussions on problems of control. (It is in place to note that Washington has been deliberately harping on this problem at other talks too, including those on various aspects of disarmament.) In particular, it is averred that it would be impossible to verify the fulfillment of commitments assumed, that effective mthods of control would be required and that these have yet to be developed. These questions are not new, they have been raised at this Geneva conference as well. Some speakers again mentioned the need to establish control when tanning nuclear explosions. However, it would first be necessary to determine the essence, the content, the technical and political instruments of control. Only than would it be possible to proceed with the termination of all nuclear charge tests. Here, for instance, is what the Netherlands representative said:

"We stress that a...moratorium which is not accompanied by adequate and effective verification measures could not be a substitute for a treaty."

Richard Luce, Minister of State for Foreign and Commonwealth Affairs, remarked that a moratorium on nuclear testing of the kind recently proposed by the Soviet Union "would be neither verifiable nor legally binding." Several more similar statements could be cited. However, all this talk about control is solely intended to avoid ending these tests, to justify their continuation and the building up of nuclear arsenals.

However, it is gratifying to note that the majority of the delegations supported the moratorium and urged the other nuclear powers that signed the Non-Proliferation Treaty to do the same.

The opponents of the moratorium attempted to accuse the U.S.S.R. of being opposed to all forms of control.

This is not so. In our report on the very first day of the conference we said that the signatories should display initiative and effort in resolving, as quickly as possible, all the technical and political differences involved in the signing of a test ban treaty, with strict and effective international control.

In the First Main Committee, which discussed the fulfillment, or rather the non-fulfillment, of Article VI of the treaty, the Soviet delegation stated that the U.S.S.R. always held that the relevant international agreement should specify adequate means of control. Incidentally, during the trilateral talks the U.S.A., Great Britain and the U.S.S.R. held on the prohibition of nuclear weapon tests (at which I had the honor to lead the Soviet delegation) agreement was reached on special control measures on the ending of such tests. Practically all the fundamental issues were resolved and recorded in a technical protocal to the draft treaty on complete and general prohibition of nuclear weapon tests. It was only because the U.S.A. adopted a negative stand at these crucial talks and walked out, slamming the door, that the treaty was not prepared for endorsement.

The U.S.S.R. agrees with many participants in the conference that control is not a problem from the technical angle. There is a political problem -- the unwillingness of certain states to end nuclear weapon tests. Far from being opposed to control, the Soviet Union stands for control over nuclear charge tests. But on condition that a political decision on the cessation of nuclear weapon tests is taken, that, as soon as such tests cease, an international control system be set up, that the scope of international control, the necessary apparatus and other technical facilities are determined. Why should this be done? To make sure that tests in all spheres, including underground tests, are ended.

The Soviet Union holds that nuclear disarmament, strategic arms limitation, complete and general prohibition of nuclear weapon tests, cessation of nuclear arms manufacture, and gradual reduction and ultimate destruction of accumulated stockpiles are an inalienable part of the non-proliferation policy. This idea is the cornerstone of the treaty on non-proliferation.

As a nuclear power the U.S.S.R. faithfully lives up to its commitments under the treaty. It favors the further enhancement of the role of the IAEA in ruling out the proliferation of nuclear arms. As Mikhail Gorbachev also pointed out in his message of greeting, "the Soviet Union is doing and will continue to do its utmost not only to stem the proliferation of nuclear weapons, but also to end the nuclear arms race and to reverse it."

In 1982 the U.S.S.R. pledged not to be the first to use the nuclear weapon. At the same time it submitted to the 37th U.N. General Assembly Session a proposal on the immediate cessation and prohibition of nuclear weapon tests. It is a fact that the U.S.S.R. has repeatedly proposed various measures to this end. The Soviet Union's unilateral decision to discontinue nuclear explosions as of August 6, 1985, was another practical step towards ending the dangerous competition in the buildup of nuclear arsenals.

In a working document the non-aligned and neutral countries jointly submitted to the conference, they emphasized the need to begin immediately talks on the conclusion of a treaty on general and complete prohibition of nuclear weapon tests. It was also proposed that all nuclear powers should forthwith announce a moratorium on all nuclear device tests, the freezing of nuclear arsenals, a ban on the use of nuclear weapons, and nuclear disarmament. Despite the stiff opposition of the U.S.A. and some of the other Western countries, the conference managed to find solutions and formulas acceptable to all the participants.

The Final Declaration it adopted states that the Treaty on the Non-Proliferation of Nuclear Weapons plays a major role in the maintenance of international peace and security. It voices the resolve of the signatories further to enhance the prestige of the treaty. The declaration points out that the spread of nuclear weapons would increase the danger of nuclear war. The purpose of the treaty -- to prevent the emergence of new nuclear states -- is being achieved.

The document takes note of the important role being played by the IAEA control system. It expresses complete satisfaction with the fact that the Soviet Union and other nuclear powers have placed under IAEA control a part of their atom-for-peace effort. The declaration has called on the People's Republic of China to act along similar lines.

It further points out that the treaty helps promote international relations and mentions the significance of the Soviet moratorium on the testing of all types of nuclear devices. The document calls for the resumption in 1985 of the trilateral negotiations on the complete cessation of nuclear weapon tests. It underscores that most countries of the world have endorsed the Non-Proliferation Treaty and declares that the next, Fourth NPT Review Conference is to be held in 1990.

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- END -

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Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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DAYA N-PLANT MAY ENDANGER HONG KONG ENVIRONMENT

Hong Kong HONGKONG STANDARD in English 29 Jan 86 p 2

[Text] THE safety of nuclear plants like China's proposed Daya Bay power station, to be built near Hongkong, was questioned yesterday by a representative of Friends of the Earth, a conservation organisation.

Ms Linda Siddall claimed that misleading data had been supplied by the nuclear industry as to the safety conditions of power plants.

Speaking at a meeting of the Peninsula Rotary Club, she urged Hongkong residents to demand that their questions about the plant be answered by those planning to build it.

Daya Bay, which will provide 70 percent of Hongkong's energy needs, is a joint venture between China and France with Britain supplying the turbine equipment. Construction is scheduled to start soon and the plant should be operating within six years.

It is located in Shenzhen, just north of the New Territories.

Ms Siddall said that while recent films and television programmes have focussed on the risks to human health posed by major nuclear accidents, there are also major risks posed by the normal functioning of a plant like the one at Daya Bay.

The nuclear industry makes three points in arguing that exposure to such radiation levels is not a health hazard, she said. One argument is that the dose receivable from a power plant is less than that from background radiation and therefore negligible.

Secondly, it is often reported that emissions are kept within safe limits set by the International Commission for Radiobiological Protection (ICRP).

Finally, the industry has stated that there is no proof that people living near reactors have increased cancer rates.

Taking each argument in turn, she said that while radioactivity occurs naturally, it does not mean that it is harmless.

"It is estimated that natural radiation is responsible for about 19,000 cancer and leukemia deaths per year in the US and at least 58,000 deaths from other disease," she said.

"Thus the argument that radiation from a reactor is negligible because it is less than background radiation is not particularly comforting," she said. "Particularly when it is remembered that such radiation is on top of the background radiation."

Ms Siddall questioned the quality of the assessments by the ICRP claiming that the make-up of the commission "which purports to be independent is a self-perpetuating organisation of scientists closely connected with the nuclear industry."

/12851
CSO: 5150/0071

STATUS OF CHINA'S NUCLEAR S&T RECAPPED

Harbin HEILONGJIANG RIBAO in Chinese 31 Oct 85 p 1

[Article by Zhuo Peirong [0587 1014 2837]]

[Text] Beijing, 30 Oct (XINHUA)--China's nuclear industry has experienced continuous growth since 1955, and its achievements have attracted world attention. A few days ago an official of the Ministry of Nuclear Industry gave a presentation to the reporters outlining the major accomplishments of China's nuclear industry during the past three decades.

--Acquisition of the technologies to develop atomic bombs, hydrogen bombs, and power plants used in nuclear submarines. China has armed its military units with nuclear weapons; the development of nuclear weapons has enhanced China's defensive strength and has been a major factor in protecting the security of this country and maintaining world peace.

--Establishment of a firm foundation in nuclear technology and a comprehensive, nuclear industrial system. This system includes organizations devoted to uranium exploration, mining and processing as well as recycling of nuclear fuel, manufacturing of nuclear weapons, and the peaceful use of nuclear energy and nuclear technology. The development of nuclear science has created many new scientific disciplines, new technologies and new industries such as nuclear medicine, nuclear agriculture and new industries such as nuclear medicine, nuclear agriculture, nuclear environmental protection, nuclear analysis and measurement techniques, nuclear display and tracking techniques, nuclear automatic control technology, nuclear radiation processing industry, and nuclear electronic instrument manufacturing industry; a number of these technologies have already been successfully implemented in various applications.

--Development of China's uranium resources and establishment of technical service facilities for uranium products and other related products. China has already accumulated a sizable reserve of atomic fuel for nuclear power plants and a reserve of uranium products. The instrument manufacturing capability, engineering design capability and construction/installation capability of the nuclear industry have been extensively used in non-nuclear applications.

--Establishment of a firm foundation in nuclear power generation. Currently China has 10 nuclear reactors of various types, and has accumulated considerable operational experience. The Chinshan nuclear power plant project in Zhejiang Province is making good progress, and efforts have been initiated in the theoretical resource of nuclear power plants for heat generation.

--Training a team of highly qualified technical personnel for the nuclear industry.

This official said that China's nuclear industry is following the current trend both in this country and abroad to redirect its energy for economic construction. In recent years, the demands of China's economic and social development have supplied constant challenges to the nuclear industry. With increasing public awareness about nuclear technology, it will undoubtedly play an increasing role in the lives of the Chinese people.

3012/9274
CSO: 4008/39

CANADA

POTENTIAL U.S. NUCLEAR DUMP SITES AROUSE CONCERN

External Affairs Study Group

Toronto THE TORONTO STAR in English 13 Feb 86 pp A1, A4

[Article by Alan Story: "US Plan for Nuclear Dump Near Border Alarms Ottawa"]

[Text] HALIFAX — The United States has selected several sites close to the Canadian border as possible locations for a major nuclear waste storage dump.

One site is in Maine across from New Brunswick, two are in Minnesota across from Manitoba and one in Wisconsin near the Great Lakes.

The selection of the sites — ignoring assurances Ottawa had thought it had obtained from Washington — has raised serious concerns that will be discussed at a special meeting of federal and provincial officials in Ottawa tomorrow.

Canada has already requested the issue be placed on the agenda of External Affairs Minister Joe Clark's next meeting with U.S. Secretary of State George Shultz. A date and place for the meeting has not been decided.

And yesterday Maine Governor Joseph Brennan urged "Canada and Canadians to speak out loudly and quickly on this frightening and terrifying idea of a nuclear dump right on your border."

Highly radioactive wastes have been held in temporary storage areas across the United States since 1945. One estimate suggests that there are 12,000 tons of spent nuclear fuel being held in temporary storage pools in the U.S.

Deposits of some nuclear materials to be stored underground, such as plutonium-239, will remain a hazard to human health for 100,000 years. Current technology has created canisters that last only 700 years.

Canadian concern has been building since mid-January when the U.S. energy deparment released its short list of 12 primary and 8 backup sites for the eastern U.S.

The four sites closest to Canada or to boundary waters — in Maine, Minnesota and Wisconsin — are all on the primary list.

Of the 20 sites on the complete short list, 14 are in states bordering Canada.

The nuclear waste dump program is a massive undertaking:

☐ Detailed field work on the 12 primary sites will last from 1987 to 1991;

☐ 3 sites then will be recommended and construction, costing between $800 million and $1 billion, will start on test shafts at each site;

☐ In the mid-1990s, the U.S. president is scheduled to choose one eastern site, expected to start operation in 2006 to 2008;

☐ A high-level nuclear dump site for the western U.S. is scheduled to be announced in April. Locations in Texas, Nevada and Washington are on the final list. Most speculation suggests Washington, which borders on British Columbia, will be chosen.

Officials at External Affairs say the issue is so potentially divisive it could create as much tension as the U.S.-Canada dispute over acid rain.

Meeting planned

"If it looks as if those sites are selected and the U.S. ignores obvious signs of danger, this could become as big an issue as acid rain or Arctic sovereignty," said Stan Gooch, chairman of a group from the external affairs department that is studying the issue, told The Toronto Star yesterday.

In the meantime, Gooch will meet tomorrow in Ottawa with government representatives from New Brunswick, Ontario and Manitoba, the provinces that would be most affected by the U.S. plan.

Gooch said that "the primary sites now on the short list still obviously concern us."

Ontario has yet to take a position on the issue, said John Carson of the province's ministry of intergovernmental affairs.

"We want to understand the full inter-governmental position," he said.

An external affairs spokesman said tomorrow's meeting is designed to firm up the department's strategy in preparation for the Shultz-Clark meeting.

Manitoba Premier Howard Pawley has already strongly protested the proposed Minnesota sites.

"We don't see why Manitoba, a non-nuclear province, should be asked to bear the risk," an official in the Manitoba environment department said in an interview.

The Minnesota sites — one less than 80 kilometres (50 miles) from Canada — are within the drainage basin of the Red River, which flows north into Manitoba.

In New Brunswick, Janice Harvey, the executive-director of the province's conservation council, said burying the waste is "a cheap and crude solution."

She is also worried about estimates that 10 truckloads of waste a day could be transported from across the eastern U.S. to a remote area of eastern Maine for 50 years.

The Maine site is within the drainage basin of the St. Croix River, which flows along the boundary of New Brunswick into the Bay of Fundy.

At whatever site is chosen, the nuclear wastes will be buried far underground in a maze of mine shafts inside rock formations. In 50 years, the shafts will be sealed.

Of the 236 initial sites, one was on the Quebec-Vermont border, another on the Quebec-Maine border.

But the two were dropped following protests last year by environmentalists and local residents. As well, federal Energy Minister Pat Carney expressed concerns to John Herrington, U.S. secretary of energy.

Gooch said that Canada has received three commitments from the U.S.:

☐ No nuclear repositories would be constructed within 40 kilometres (25 miles) of the border;

☐ None would be within drainage basins flowing into Canada; and

☐ None would require geological exploration in Canada.

But an official with the U.S. energy department said yesterday that the U.S. has only agreed to one of the three.

Roger Gale, a senior official in the nuclear waste program, says the U.S. will not do any geological field work on Canadian territory.

Rock formations

Some of the propored dump sites are less than 40 kilometres from American centres and "why should we protect your citizens any more than our own," he said.

So many of the primary sites are near the border, Gooch said, because most of the granite rock in the U.S. is located near there. And, more importantly, the border areas are generally far from major American populations centres.

"Political considerations will mostly determine where the waste dump will go," he said.

American officials — and Canadians who don't yet know all the details — are expressing similiar concerns about both the process of selecting the sites and the criteria used.

One worry is the lack of time for consultation. Although the U.S. President is not expected to choose the eastern U.S. site until the mid-1990s, residents of the affected states have been given only until April 16 to make known their concerns.

Provincial Representatives' Meeting

Toronto THE SATURDAY STAR in English 15 Feb 86 p A3

[Unsigned article: "Ottawa Vows to Protect Water from U.S. Nuclear Dump"]

[Text]

OTTAWA (CP-Staff) — The federal government will seek assurances from the United States that if a major dump for nuclear waste is built near the Canadian border, it will not pollute waters flowing into this country.

Representatives from four provinces — New Brunswick, Quebec, Ontario and Manitoba — met yesterday with officials from the external affairs department to set up committees to study the legal, diplomatic and technical aspects of the controversial U.S. plan.

Last month, the U.S. energy department published a list of 12 of the most likely locations for a nuclear waste dump, one of which will be chosen in the mid-1990s.

One site is in Maine, two are in Minnesota and one in Wisconsin.

Got assurances

The dump would go into operation about 2006 and would hold radioactive nuclear waste and spent fuel now accumulating in storage pools around the eastern U.S.

Stan Gooch, chairman of the group and its representative from external affairs, said in an interview that Ottawa has received assurances from Washington the dump site ultimately chosen will pose no hazard to anyone.

The Canadians want to ensure than no contingency is being overlooked and that the Americans stick to their pledges, he said.

"Those promises really are statements of principle. But it's up to us to ensure that they're implemented in practice."

External Affairs Minister Joe Clark has raised the issue with U.S. Secretary of State George Schultz at previous meetings and probably will do so again when the two men meet in Washington next month.

Several committees

Gooch said one subcommittee of his group now will study scientific and technical literature to determine the safety of U.S. techniques for transporting the waste to such a site, transferring it into the site and locking it into the ground so there would be no leakage for an indefinite time.

Another group will determine what legal and diplomatic weapons Canada would have at its disposal to ensure the safety of residents north of the border.

Gooch said the focus now is on the boundary waters treaty, which obliges both countries not to take any actions within their own territory that could result in a hazard on the other side of the border.

Along with provincial officials, Gooch's group included representatives from several federal departments and the Atomic Energy Control Board. It plans to meet again next month and will propose a meeting with American officials in April, he said.

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CSO: 5120/31

CANADA

BRIEFS

NEW BRUNSWICK RADIOACTIVE LEAK--Saint John (CP)--New Brunswick Electric Power Commission officials at the Point Lepreau nuclear reactor near Saint John are beginning to get concerned about a leak of radioactive heavy water. They can't find it. The water is leaking at a rate of about 2.5 litres (half a gallon) an hour but is no danger to the public because it's flushed into huge amounts of sea water, said plant manager Roger MacKenzie. [Text] [Toronto THE SUNDAY STAR in English 2 February 86 p A17] /12851

DOUGLAS POINT LEAK STEMMED--Tiverton, Ont. (CP)--Workers at the closed Douglas Point nuclear station have managed to stem the flow of radioactive water leaking from the plant into Lake Huron. Ontario Hydro workers sealed a spent fuel storage bay, cutting the flow of slightly radioactive water to 454 litres a day from 2,200 litres. [Text] [Ottawa THE CITIZEN in English 14 Feb 86 p B10] /12851

CSO: 5120/31

BULGARIA

OBSTRUCTION ENCOUNTERED IN CONSTRUCTION OF BELENE NUCLEAR UNIT

Initial Construction Difficulties

Sofia OTECHESTVEN FRONT in Bulgarian 25 Nov 85 pp 1, 4

[Article by Vladimir Rupov]

> [Text] Editorial note: This major project was recently visited by group of editors. Discussions were held with the leadership of the city and the construction of the nuclear electric plant. These discussions gave us our initial impressions on the avalanche of problems which must be resolved here. Articles will be written in which an effort will be made to earmark more clearly some of the ways to resolve them. A cooperation contract was concluded as well with which the editors of OTECHESTVEN FRONT undertakes to help to resolve the main problems of the construction project and draw the attention of our public to them.

If the cushion of gravel on which the nuclear reactor stands were to yield by half a millimeter only, the reactor would work at no more than 50 percent of capacity. This is not only an impressive but an extremely strict and practically confirmed fact. No more than half a millimeter and not only hundreds of megawatts of power but also hundreds of millions of leva, rubles, dollars and marks would be lost....The percentage of losses shows no privileges and the type of currency will be determined by the carelessness of the official.

Simple arithmetic will produce an equation according to which the building of low-capacity nuclear reactors is much more advantageous, for if we were to lose half of the megawatts we would not have lost half of the capital investment. A 1000-megawatt reactor is at least triple the cost of a 500-megawatt reactor.

But then why are we building it? We are by no means the first to have asked this question, as we stand by the fields of the future Belene nuclear electric power plant. For the energy picture of Bulgaria through the next century will be shaped by the six 1000-megawatt reactors. Almost 50 percent of our electric power will be generated in nuclear electric power plants. However, this is not in the least any aspiration of prestige to be among the 10 highest producers. It is the only possible choice if we want a secure support for a powerful economy and the growing needs of our way of life. Although the risk is not eliminated, it is well considered. Furthermore, the experience which has been acquired, the skill and feeling of responsibility of the construction workers substantially increase the reliability coefficient on the safety scale.

In the final account, the organization of the construction project, the time saved by installing much greater capacities simultaneously, the greater safety and the lower cost of the energy are incontroversially proving the advantages of 1000-megawatt units.

"The pouring of the gravel cushion is taking place under the strictest possible control," we were told by Hero of Socialist Labor Engineer Vasil Pankov, the chief of the construction project. "Even a tolerance of a minimal error has been excluded. Should there be a sharp drop in temperature and should the upper stratum freeze we would remove it and start pouring once again."

The bed in which the cushion will be poured is 21 meters deep. It has already been lined up with concrete on top of a firm marl rock. One hundred and twenty thousand cubic meters of quarried materials have been taken out of the Danube River and heavy machinery is preparing the "bed" of the first reactor. Another 200,000 cubic meters will have to be removed to provide the final shape of the cushion. These figures alone confirm Engineer Pankov's words to the effect that we are witnessing the largest Bulgarian construction project for the 20th Century.

A quick reference to the bulletin of the International Atomic Energy Agency proves that we are in step with world practices in the construction of nuclear power plants and that 1000-megawatt reactors are not the whim of a megalomaniac but a well planned strategy. An excerpt of a table in this bulletin confirms the fact: in 1982 the power grid of some countries included the following reactors, classified in terms of power: USSR: Smolensk 1, 1000 megawatts; Chernobil, 3, 1000 megawatts; United States: Lassalle 1, 1078 megawatts, Virgil Summer, 900 megawatts and Grand Half, 1, 1055 megawatts; FRG: Graffenrhainfeld, 1225 megawatts.

We were told that Belene the only city on the Danube which has its back to the river. Now it must turn around and face it. Without the Danube the power plant cannot live. The river will provide the necessary water for cooling the nuclear reactors. However, turning a city around is not like turning around a person, the more so since this city should be facing the same direction as the power plant, i.e., it will have to be looking at the 21st Century. For the time being, the project has still not been proclaimed national and its initial steps are real tributations. Suffice it to take a brief look at the flood fields to understand, even by people most ignorant of technology, that the equipment assigned here would be more suitable for the building of a large support facility that than such a huge construction project.

However, this is merely the beginning. Equipment will be made available. Thousands of construction workers with their families will come.

Kindergartens and schools must be built for the children; each family will need a home and the market will require double and triple amounts of meat, milk, bread, fruits and vegetables. In all likelihood, a single movie theater will not suffice and the local library will have to add many books to its stock. Where will the wives of the construction workers work? Will there remain people working as mechanizers at the agroindustrial complex considering that salaries at the construction site will be much more tempting! Yet the Belene APK [Agroindustrial Complex] is one of the best in the country and the local leadership has made the firm decision that the agricultural structure here must be improved and that profits will not disappear so that budget subsidies may become necessary. Yet examples of decline of agriculture near large national projects do exist. It is as though the future nuclear reactors near Belene are loaded with a number of problems. We felt this tension even in Pleven, where we watched the video tape being taken to record some of the problems of the big construction project, by a special newspaper crew, together with Kuncho Kunev, chairman of the okrug people's council. What about Belene? Here it is as though we can feel the first moves of the earth's crust before the eruption of a volcano. However, no one is passively waiting, for this explosion must be controlled so that there will be no upheavals in the construction of this project which will be representative of Bulgarian construction for the last 15 years of this century and so that Bulgaria may begin calmly its discussion with the 21st Century.

Changes in Belene

Sofia OTECHESTVEN FRONT in Bulgarian 11 Dec 85 pp 1-2

[Article by videotaping crew: Mikhail Gorinov, Zakhari Nikolov and Boyko Kunchev]

[Text] We must admit that we were somewhat late arriving at the construction site of the second Bulgarian nuclear power plant on the territory of the Belene settlement system. This is the fourth year during which the efforts of designers and construction workers are focused in building, step by step, the new energy projects of the country which, together with the AETs [Nuclear Power Plant] in Kozloduy will account for nearly one-half of all the light generated in Bulgaria at the beginning of the 1990s, at the site of the ancient Roman city of Dimum dating from the 1st Century AD.

The need for electric power demands no proof: it is electric power produced in quantities which exceed current needs, according to the party's strategy, that is necessary in order increasingly to satisfy the steadily growing needs of the people and the development of the national economy.

As we said, we were somewhat late in concentrating on the building of the Belene AET, in the same way that concern shown for it had been slow on the part of a number of bodies, organizations, departments and leading economics managements. Naturally, we must take into consideration the condition and possibilities of the state, which are not unlimited. The videocrew dispatched by OTECHESTVEN FRONT dedicated its cassette No 4 to the construction of the second nuclear power plant.

We were unable to show the dynamic and prime beauty of the city of Belene, streets are already lively with traffic: people hurrying somewhere, most of them, not to say all of them, having linked their lives to the development of this city as the second capital (but why "second?" Chronologically, yes, but what about scale) of the Bulgarian nuclear power generating industry. Will Belene and its settlement system be able to suitably welcome the thousands of construction workers, installation workers and specialists (and, naturally, their families!) who will be coming from all over the country? Will we be able to catch up with the losses in terms of time, funds and labor? What is the current situation at this huge construction project?

It was as though Engineer Yordan Stoyanov, secretary of the general construction party committee at the Belene AETs was expecting this videocamera:

"We are currently engaged in the so-called engineering preparations for construction. For a number of reasons we are unable to implement our assignments. This has brought about the nonfulfillment of the engineering program for the five-year plan. For the past two years Energostroymontazh, the main contractor for the project, has been without a superior organization, which has delayed the solution of problems...."

To the best of its possibilities, the videocamera is recording the foundations of the construction site in this weather, which to say the least, is poor. It is here that the gravel cushion will be poured to support the hull of the main reactor. We spoke with two of the managers of this project, Engineer Tsocho Petrov, who represents the investor and who supervises the project, and Engineer Georgi Prodanov, one of the pioneers in the construction of the power plant. No work was under way at that time due to the poor weather. All in all, from the very beginning, the construction project has fallen more than 1 month behind. The reason is the lack of mechanization facilities. What the project needs is rollers, dump trucks and, above all, tents, which are lacking. Ordinary trucks are trying to run through the gravel, become mired and, as is natural, must be pulled out with bulldozers which have other duties and, for which reason, are in short supply. The pace is slow. The construction is already falling behind and its cost is increasing.

The small dam which has formed on the site of the so-called flood field, which should have been covered with dirt is the bitter consequence of all negative factors and the part with which we began our video recording.

We then recorded the site where the temporary settlement for the construction workers should have been built. We say "should have been," for so far all we can see here are a few trailers. The camera also shows a number of initiated yet slow developing activities. In order to cover the field, before the end of March 1986 some million tons of sand and gravel will have to be extracted from the Danube River. There is already a delay of almost 2 months. Also delayed is the building of one of the main projects--the concrete production plant, which is one of the most important, for next year it is scheduled to produce the first quantities of concrete for pouring the foundations of the reactor. The various specified types of armature iron are not being received rhythmically. Yet, this project will determine subsequently the next one, we were told by another of our interlocutors, Engineer Mitko Kevov.

Can only seven or eight people build the port of the power plant, which should have (again that "should have"!) been completed by the end of 1985? According to Engineer Bernard Slavov, talking to the videocamera, so far only half of the plan has been fulfilled!

It seemed to us somewhat unexpected to see a woman here: Engineer Vyara Todorova, who is the manager of the building of the warehousing-production plant; we recorded her energy and concern. By the end of August, 800 ofthe 18,000 cubic meters of reinforced concrete structures contracted for 1985 had been received. This as well, as we pointed out, is slowing down the construction of the plant and the consequences are major.

"We see two cranes here," we recorded in the next part. "However, today they were not working, for the prefabricated elements had not been supplied. This is costing money because of the idling and, furthermore, today the construction has not progressed. Nor are the supports for the roofing elements available, thus dooming the latter to destruction. The reason is the fact that their transportation from the producing plant in Ruse had not been organized.

We also filmed the areas on which the building for special metal structures should have been constructed. The elements are arriving but due to lack of workers and equipment the construction has not been started.

"There are very few of us to undertake so much at the same time," Engineer Vyara Todorova concluded.

"How do you imagine the city after the completion of the nuclear electric power plant?" was the only question which we asked people on the streets. The answers were optimistic:

"With more young people!"

"With more housing, institutions for children, schools and cultural establishments!"

Milin Nikolov, chairman of the executive committee of the obshtina people's council, summed up the impressions:

"The pace at which the basic structure needed to meet social requirements is developing does not meet the needs of Belene with its 30,000-population over the next few years (currently this is a city of 10,000 population)."

Our "Videoconclusion:"

We expect that the decree to be promulgated by the Council of Ministers on the construction of the Belene AETs will formulate the problems properly and they will be resolved successfully. Our people, who build Dimitrovgrad, Kremikovtsi, Devnya and the Kozloduy AETs, who build huge heavy machine building enterprises, will find the strength and means to build its second nuclear electric power plant in Belene.

We developed this feeling as we studied the problems and met with the personnel and managers at the construction site and as we were trying to document it in the fourth video film, which we named "Between Optimism and Problems." Anyone who feel responsible for the present and the future of the Belene AETs can see our editorial videocassette No 4 and give us his optimistic answer.

High-Level Seismicity

Sofia OTECHESTVEN FRONT in Bulgarian 12 Dec 85, pp 1-2

[Article by Vladimir Rupov, Todor Tsvetkov and Yani Boychev]

[Text] In terms of nerves and wasted time, in waiting, as our editorial practices certify, trying to talk by telephone with Engineer Vasil Pankov, chief of the construction project at the Belene AETs from anywhere in the country, is the equivalent of a telephone conversation between Sofia and Katmandu. It would have been much simpler if Engineer Pankov had been in Moscow, London or New York.

If you happen to miss the train from the Oresh station to Belene you would have to wait for the next train more or less as long as it takes an artificial satellite following a specific trajectory, to circle the earth twice.

The point has already been made that any comparison is "lame." So are, probably, ours, the more so since there are people who will point out quite a number of "objective" arguments against them.

Nevertheless, the truth remains. We further clarified this truth in the course of our meeting with the management of the city and the construction project of the nuclear power plant, as a continuation of the discussion which was filmed by the OTECHESTVEN FRONT videocrew the previous day. The flood of thought which were expressed, alas, does not lead to any sensational conclusion. Rather, it is charged with the same type of tension and high seismicity as that of the Belene soil.

Sufficient for a Sports Complex but not for a Nuclear Power Plant

For centuries dark and sinister legends have roamed the swampy waters near Belene. Many fishermen failed to return home, swallowed, in all likelihood, not by sinister forces but by the treacherous mire which lines the bottom of the Svishtov-Belene swamp. Here and there little parts of arable land could be found. The main occupation, however, was fishing. The swamp was drained off after 9 September and the mosquitoes and malaria were forgotten. However, the treacherous nature of the soil remained. The simple crossing of the area is a headache. That is why drills at several meter intervals have tried to detect the most solid foundations for the nuclear power plant. Yet such foundations should cover neither 2 nor 20 decares. The area to be covered is quite impressive--2,800 decares. Furthermore, no "wholesale" waste of land is allowed. The construction site is maximally condensed. Therefore, if we are to make a comparison with the pioneer of our nuclear power industry--the Kozloduy Nuclear Electric Power Plant (in the course of our discussion such comparisons became frequently necessary), we would see that the efficiency per square meter of "nuclear" soil is much higher, for many more capacities (6,000 megawatts as compared to 3,670 in Kozloduy) will be built on a smaller area.

Actually, any comparisons with our first nuclear power plant are not triggered by the desire to emphasize differences between these two energy giants. The word "Kozloduy" is mentioned 26 times in the 23 pages of the record of the Belene discussion. Kozloduy means, above all, experience, both positive and.... cautioning and, in some respects, instructive.

The study of experience, naturally, did not lead to any new super-discoveries or super-original decisions. The necessary interpretation simply led to rational solutions. Today all buildings of the bases which will parallel the main production will not have to be destroyed not to hinder the expansion of the power plant, thus senselessly destroying capital assets. Initially, this seems as simple as the egg of Columbus. The question, however, is not one of thinking about it but of learning from it.

Experience has indicated that the construction workers here would like that a basic construction feature be respected: initially the construction of the underground facilities of the site which, unfortunately, is quickly ignored, in order to avoid the building of such facilities parallel (or subsequent) to the basic construction. Once again, experience has indicated that the violation of this rule leads to the creation of a rather unpleasant and confusing maze.

Desire, however, is one thing and reality is something entirely different. That is why, along with optimism, concern is hovering over the construction projects: shall we be able to complete everything as we intended? Will every unit, brigade and individual work rhythmically or will time be wasted as a result of which, in the final account, three workers will be crowded in a space of 2 square meters and their main concern will be to avoid obstructing each other's work.

Avoidance of such a cluttering would be the ideal choice and an unattainable masterpiece of construction organization in our country. But let us remain optimistic and describe the situation at the construction project as it is today.

Engineer Nedko Nedkov, director of the investor's office:

From the investor's point of view, the most important thing now is to speed up the drafting of the blueprint. This will open the way to the basic planning of the plant. In turn, this will lead to the conclusion of contracts for equipment procurements. It is very important for Energostroymontazh, the construction organization, to strengthen in 1986 and truly become the main contractor for the basic power equipment.

Engineer Vasil Pankov, construction project chief:

We need the Council of Ministers decree on the accelerated construction of the Belene AETs as soon as possible. For the time being, we have no privileged status in terms of recruiting people from other projects, although such people are available. The decree will open the doors of many departments, some of which seem to have been totally ignorant of our project to this day. The decree will also guarantee funds and resources.

Problems for Discussion and Thought, Addressed to Ministries, Departments and Okrug People's Councils

Years ago there were eight trains per day from Oresh station to Belene station. Today there are three. The justification is the insufficient passenger load and the unprofitability of the train.However, a high concentration of people is expected in Belene the very next year. Specialists will come here from the country and abroad. Would it be impossible to assign a motor coach with even a single car, which would make the railroad transportation schedule more acceptable? Is it possible for the Ministry of Transport to ignore its departmental interests somewhat?

A telephone exchange is being planned. However, until this is completed, until it is built and commissioned, most likely many people's hairs will turn white (at best). However, the Ministry of Communications has its schedules and deadlines as well. They may be considered suitable by the Ministry but...

A high percentage of the freight (more than 2 million tons) has been assigned to the "Automotive Transportation" SO [Economic Trust], considered under the rubric of "technological transportation." Consequently, the trust is outside the range of departmental interests. Nevertheless, such freight must be hauled. For the time being, transportation facilities (and not only they) are adequate for the building of a sports complex, but not for a nuclear power plant.

People will be assigned to work at the project by powerful construction organizations, such as the Assemblies DSO, Khidrostroy DSO and Industrial Construction DSO. What type of cadres, from where and when will they be redirected to Belene are problems which must be resolved in advance. A spontaneous influx of manpower into the city has already started. This will inevitably lead to conflicts, disorder and chaos.

Housing is Being Sought Along the Danube

The land here is highly seismic. The builders of the power plant are taking this fact into consideration. Whether or not the earth will ever shake is something for nature to know. Mathematicians can only compute the fact that this will occur according to the theory of probabilities. However, the peaceful atmosphere in the city, which prevailed until recently, is now charged with even greater seismicity, which exceeds the Richter or Medvedev, Sponcheier and Karnik scales.... It is of a social nature, which means that it could be controlled and an earthquake avoided. We are expecting in the immediate future for the seismologists to forecast earthquakes. Meanwhile, here, all above the earth, the possibility of an "earthquake" has already been confirmed, given a certain amount of inaction.

Kiril Angelov, first secretary of the Belene Obshtina BCP Committee:

Poor preparations for such a major construction project will create a supertension. Funds will be wasted and there will be human "spoilage." Our task currently is to prevent conflicts between local cadres and construction workers. We have explained the problems related to building a nuclear power plant. It will be necessary to restructure the entire economy of the obshtina and to subordinate it to the construction project.

Above all, housing! This phrase has almost turned into a slogan. However, what type of housing is the question, posed not by us alone. Will they be huts, or single-family housing with yards, or else the familiar term "residential district" spoil the Danube shore? The management of the settlement system has taken the categorical view that Belene must become a beautiful city with its own oroginal appearance. It must become the "pearl on the Danube." How to build essentially single-family houses with yards and gardens and how to harmonize the residential complex with the environment? However, so far the construction done does not meet these requirements. It would be quite interesting for the development of the regional design organization to be applied not directly but, as has been frequently done elsewhere in the world, to be submitted to the public for its views. Another major problem which involves a great deal of question marks is what should come first: the construction of the housing or the power plant? Or else, should they take place on a parallel basis?

At the beginning of 1986 thousands of people will come here. Apartments are being sought in the city and the surrounding villages. However, these are palliatives which, although necessary, are merely a temporary step. The urban construction plan has been drafted. However, it is inadequate if it is to prevent to the "pearl on the Danube" to turn dull even before it starts shining.

Not all construction workers are bachelors. That is all right, but where will their wives work, and where will their children go to school? For the time being, it would be suitable for such children not to be older than six, for places in kindergartens exist. An agreement has been reached with Farmakhim to build a shop as a result of which the coexistence between a cosmetics industry with the nuclear power industry offers an original solution. However, why should we wait with the construction of this shop?

The AETs-APK is the Gordian Knot

The old swamp with its "sinister forces" and dark legends is now fruitful land, owned by the agroindustrial complex which, so far, is one of the best in Pleven Okrug. No specific description of the complex is necessary. It has an excellent dairy farm, intensive crops and profitable production.

The AETs is not stolen land, for the 1,000 decares needed are underproductive, frequently flooded by spring waters. The humus has been removed from 1,500 decares of fertile first category land and laid on other previously unused soil. The first shock has thus been avoided.

Kiril Angelov:

Our plans include agriculture which will satisfy the needs of the construction project. However, we are unwilling to be subsidized, as was the case with agriculture near some large industrial construction sites. We fear, however, that unless we are able to master the manpower draining process on time, in 5 years there will be no one even to receive subsidies. We would like our APK to be retooled quickly and acquire modern equipment and use new technologies. This will result in higher productivity and increased wages. We would be committing a crime if we wrecked this complex.

Meanwhile, however, opposite views are already being voiced in the okrug. One is that the agroindustrial complex should become an appendage (properly described as "auxiliary farm") of the power plant, at which point the temptation of higher wages will be eliminated. Another view is that agriculture should develop independently. It must be modern and highly intensive. It should represent a closed cycle consisting of small processing enterprises, for milk, bakery goods, meat products and carbonated beverages (this also is a firm foundation for resolving the problem of female employment). The view of the National Agroindustrial Union remains unknown. However, even that view will not suffice. As the sociologists say, this is an open question. However, it is not a question of endless delays or hasty solutions. The proper answer to the equation with many unknowns is that the agroindustrial complex must not be allowed to sink. It must not go down into the Svishtov-Belene swamp which has already been drained off and is safe. It must not disappear in the storm of the nuclear reactors. The formula remains to be found.

5003
CSO: 5100/3015

BULGARIA

CONSTRUCTION OF KOZLODUY NUCLEAR STATION FACES DIFFICULTIES

Sofia RABOTNICHESKO DELO in Bulgarian 6 Dec 85, pp 1, 3

[Article by Engineer Oved Tadzher, representative of the Council of Ministers Bureau: "Forward but with Inadequate Speed"]

[Text] The timely start-up of the fifth energy block at the Kozloduy AETs is self-evident. Thanks to the steps taken by the BCP Central Committee and the Council of Ministers, significant labor and material resources have been concentrated on the project. Many problems related to providing the necessary materials have been resolved with the help of the Ministries of Construction and Settlements and Energy, as well as the associations participating in the building of the project. Many enterprises throughout the country, to which we turned with emergency orders, responded with great willingness and total understanding.

It was thanks to all such measures that procurements with materials and equipment improved significantly. The annual plan for the basic construction of block No 5 is being overfulfilled. Although the plan for construction and installation projects for 1985 was increased by 50 percent, the collective fulfilled its task by 30 October.

The main target of construction and installation workers is to undertake the circulation flushing of the reactor section in honor of the 13th BCP Congress. This will prove the readiness of the main technological systems of the first circuit. The second main task is the testing of the steam turbine in the old part of the plant. This will test the readiness of all systems of the second cycle as well and eventual omissions will be eliminated.

If these tasks can be implemented successfully and within the stipulated deadlines, adequate prerequisites will be established for the initiation of start-up operations at all systems during the month of September and October 1986 as well as preparations for the commissioning of the block. The remaining operations must be completed before the autumn-winter season has arrived.

Schedules were drawn up and resources needed for the implementation of such objectives determined with the great help of the Soviet specialists. Unfortunately, such schedules and programs are not being implemented. Many construction and installation organizations, manufacturing plants and design organizations and ministries are poorly implementing their obligations. They repeatedly make promises and issue deadlines which they subsequently change.

The Industrial Construction DSO [State Economic Trust] failed to complete construction at a number of subprojects and to create conditions for work in winter. Poor work is being done by branches in Ruse, Pleven, Silistra and MSK in Kazichene, which have violated their deadlines repeatedly;

The Main Administration of Construction Truths has fallen behind in completing the underground structures;

The main organizations--the Industrial Construction Enterprise in Kozloduy and Energostroymontazh, in Kozloduy, are also violating their deadlines;

There is a great delay in installation work. The need for 570 highly skilled workers is particularly urgent.

Briefly, delays are growing with every passing day and planned deadlines are being violated. Currently the pace at which installation work is being carried out is about 80 percent of the planned figure. The fact that the task can be fulfilled yet schedules are being violated on a daily basis is creating concern among the collectives, in the party organization and among the project's management.

Major difficulties are caused by procurements of some imported or locally produced types of equipment. We are also concerned with the question of procuring sealed sluices produced at the Heavy Machine Building Plant in Radomir, without which the construction part of the reactor section cannot be completed during the winter and nor could any tests made of the sealing, which should take place before the circulation flushing.

Experience acquired in the operation of nuclear power plants using the same type blocks in the USSR proves that their successful utilization is possible only after the completion of all construction and installation projects and start-up tuning operations, most of which are carried out by the operational personnel. Some members of this staff have still not been appointed due to the lack of housing. Yet the program for completion by 30 October, despite all guarantees given by the Vratsa Okrug People's Council, has been implemented no more than 60 percent. This is having a rather adverse effect on the recruitment of skilled cadres.

Council of Ministers Decree No 11 stipulates the commissioning of block No 6 to take place in June 1988; this means that construction and installation work must be completed in 1987. Virtually no work was done on this block this year for lack of workers. It was only in October that work on the main hall was initiated. However, the pace is unsatisfactory.

Nevertheless, the collective is fully confident that the deadline will be kept. In order for this confidence to become reality, we must urgently, even before the end of 1985, establish and approve the specific resources which will be allocated in 1986. Important problems must be resolved in 1986. However, we are already noting delays in metal and material procurement. For more than 4 months the metallurgical industry has been unable to produce metal for the machine hall. No contracts for the procurement of imported equipment have been concluded. Only a few days remain until the end of the year, and the collectives are still unaware of their 1986 assignments and the amount of already procured resources. The plan for material and technical supplies for the first quarter remains unratified and a large percentage of metals and materials needed have special features so that their procurement requires a longer period of time.

The organizations participating in the building of the power plant have accumulated significant experience. The sixth block will be built on the basis of new technology with maximal application of existing domestic and Soviet experience. Possibilities will be sought for changing the designs. It is planned that after the commissioning of block No 5 the manpower will be reduced as the result of improved labor organization and new design. The main thing, however, is for the good intentions not to remain on paper only. This will require of new developments in the work, such as target planning, construction based on firm contractual value, target deliveries of materials, resources and mechanization facilities, etc. Adequate conditions have been provided for such a new approach: block No 6 will be built on the basis of the same design. Consequently, a real base will exist for planning and resource support, which will be based on the design documentation. However, such a target approach is not being applied currently. Serious steps must be taken to lower the cost of the block by reviewing the cost of machine-shifts, computations and the cost of equipment.

The design organizations face a very important task. Block No 5 is being built on the basis of partial planned readiness; designs are supplied only 2 to 3 months prior to the initiation of the construction or the assembly work. This does not allow normal planning and a great deal of funds and manpower were wasted in eliminating design disparities. The recurrence of such errors in block No 6 should be eliminated. This is a prime task of the design organizations which, however, are still not implementing it properly. The designs for block No 6 largely repeat the errors of block No 5 and are also being delivered with delays. Nor should we ignore the requirement that projects must reflect all constructive solutions based on the new plan for the organization of construction.

Currently the main efforts are focused on the completion of block No 5. Meanwhile the problems of the second 1000-megawatt unit tolerate no delay and must be resolved in the shortest possible time.

5003
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BULGARIA

DELAYS IN CONSTRUCTION WORK OF NUCLEAR UNIT IN KOZLODUY

Sofia TRUDOVO DELO in Bulgarian 3 Jan 86 p 1

[Article by Lt Col Stoyan Tsenov: "Kozloduy AEK [Nuclear Power Combine]: Plus-Minus Balance"]

[Text] The subunit in which Officer Ivanov is serving is building the underground engineering facilities for the fifth and sixth power blocks of the Kozloduy AEK.

In 1984 and 1985 it built 34 kilometers of cable, water main and sewer beds and hundreds of revision and collection shafts.

The subunit fulfilled its construction assignments for 1985 in terms of volume as early as 30 November 1985; by the end of the year it completed additional construction and installation work worth another 150,000 leva.

These results indicate that the assessment of the activities of this army collective should have been positive but...there does exist a "but" which moves the arm of the scale to the minus sign.

This applies to the lagging which occurred at the end of 1985 in five central areas of the project.

The lagging ranges between 10 days and 1 month.

What are the reasons? Who is to be blamed? What steps are being taken to heal the military collective from the dangerous disease of "rewriting deadlines?"

Let us not spread ourselves too thin and consider only two of the five lagging sectors: subprojects "Underground Engineering Facilities Between the Diesel Generator Station--Two Cells and the Reactor Section" and "Shafts for the Sprinkler Basins." These projects were entrusted to the squads commanded by Officers Urumov, Dinovski, Mikhaylovski and Petrov.

For what reasons has the construction of the first project been delayed?

The Assembly DSO [State Economic Trust] was late in providing the co-performer of the assembly project with specifications for the additional pipelines for nitrogen, sulfur and air; the representatives of the permanent authorship supervision provided by the Energoproekt Engineering Organization in Sofia were late in providing the route of the track for the industrial pipeline: the groups of "Plant Construction" were 14 days behind in clearing the tracks of existing subcrane engineering systems; the Assembly DSO was also sluggish in beginning work on the thus open front.

I saw the way the muddy and oily waters which poured out of the reactor section were able to cover in a matter of seconds fresh concrete poured in one of the channels for cables and how half a day worth of labor by the boys of the squad commanded by Lt Petrov was wasted.

The construction troops sluggishly broke up and cleared the additionally discovered concrete blocks near the reactor section.

Matters are simpler at the second project. The reasons caused by outside factors are minimal, and nothing prevented the subunit from completing the shafts on time, the more so since the sprinkler basins have been ready for almost 2 months.

The situation now has changed radically. The order issued by Comrade Oved Tadzher on the timely and qualitative completion of the construction work is being explained in a businesslike manner. Work is being done in two shifts and efforts are being made to make every hour count.

The military personnel are convinced the assignments will be completed on time and that the subunit will not be the reason for any delays in the start-up.

The soldiers are making efforts for the assessment of their work to shift from negative to positive where it has been throughout all construction done so far in the underground engineering facilities of the 1000-MW reactor.

5003
CSO: 5100/3017

BULGARIA

SHORTCOMINGS AT CONSTRUCTION SITE OF NUCLEAR UNIT IN BELENE

Sofia TRUD in Bulgarian 9 Jan 86 p 1

[Article by TRUD correspondent Dimcho Khitov: "Construction on a Broad Front at the Belene AETs [Nuclear Power Plant]"]

[Text] Before the foundations of the first reactor are poured on, the efforts are concentrated developing a normal work environment and living amenities.

The rumbling of hundreds of dump trucks and thousands of human voices can be heard in these January days, on the fog-covered roads of the Belene AETs. Earth is being removed along the roads, bulldozers and scrapers are crawling and gantry cranes are leaning. Here and there the fronts of residential and auxiliary buildings emerge.

The deep foundations of the first energy block are being filled with a many-meter thick sand cushion with increasing speed. The foundation of the reactor will rest on them. The construction workers are hurrying to catch up with their lagging during previous years and to be in step with the new schedule.

"Belene is the second AETs but will be the first in terms of capacity," says Vasil Pankov, chief of the construction site. "It will consist of six 1000-megawatt reactors. The first power block will be commissioned in June 1991 and one block will be commissioned every 2 years after that. In other words, by the year 2001 the Belene AETs will be completed and will generate billions of kilowatt hours of electric power to meet the needs of our country. At the peak construction years, such as 1990, as many as 20,000 workers and specialists will be at work here and construction and installation work worth 210 million leva will be completed. Due to a certain lagging in engineering preparations and residential construction, 1986 and the entire 9th Five-Year Plan will be a period of considerable efforts and trials for all of us. Because of insufficient funds, in the past years we have constructed 360 housing units; 4,500 will be needed during the 9th Five-Year Plan. The city of Belene, which is the closest to the construction site, does not have good commercial procurement systems due to the lack of commercial warehouses; it has insufficient institutions for children and schools and its transportation connections with Pleven and the rest of the country are poor. Yet this year alone the number of construction workers at the project will more than triple, totaling 5,500 people.

Actually, what has been and what remains to be built for the work to go well and in order to meet the planned start-up deadline for the first power block? During the so-called period of "preparatory construction of the Belene AETs in the 8th Five-Year Plan" the road to Svishtov was completed. A boiler facility was built for residential and production needs, a repair-warehousing base, a new concrete plant with a capacity for 3,000 cubic meters of concrete per day, a consumer services combine and a worker polyclinic with a hospital capable of caring for 25,000 people; two other housing blocks totaling 1,040 apartments are nearing completion. Work is progressing also in pouring the multiple-meter deep sand cushion. The flood areas have already been covered with dirt and on the eve of the 13th BCP Congress we shall begin pouring the foundation on which the bed of the first power block of the plant will rest."

At the same time, as is the case with any new major project, Belene has problems which concern the construction management and the people who have come to work here. On the one hand, they are caused by the delayed planning of some of the basic AETs subprojects, the fact that the wages of construction workers have not been equalized with those paid at the Kozloduy AETs (because of the delayed classification of the construction project as national) and, on the other, there are problems related to consumer services.

Belene, a small city distant from the okrug center, located along the Danube River, which itself is experiencing difficulties in trade and transport services, must all of a sudden meet the needs of several thousand guests--construction workers. How can this be accomplished without a bus terminal and with only two trains linking it with the Oresh railroad station, and with children's institutions and schools based on meeting Belene's current needs?

"With the help of the okrug party, economic and trade union managements and representatives of trade and transportation organizations in Pleven," answered Milin Nikolov, chairman of the Belene Obshtina People's Council, "we drafted a specific program with specific individuals in charge and deadlines, aimed at the fast resolution of social, housing and other problems of construction workers, the number of whom will continue to increase in this area. The first four stores have already been opened on the ground floors of the residential blocks and we are planning for two more. We have provided land and financing for three children's establishments and a school. We have made available a construction area and are planning a bakery, a new bus terminal and the creation of a commercial warehouse. We are currently looking for and registering all available private premises for the construction workers. We are reconstructing and updating restaurants and cafeterias. Our transportation facilities to the okrug center and other settlements are still inadequate. We have no regular lines."

The combined program for resolving the problems of construction workers at the Belene AETs has been made part of the plans of all Pleven and Belene bodies and organizations and the implementation of the various measures is being controlled. The construction and installation combine in Pleven must build 1000 apartments for the construction workers, made of prefabricated panels, 600 of which have priority deadlines. By September a camp with temporary huts for 1000 people must be completed and a hostel is being designed.

"According to the program for the accelerated construction of the Belene AETs," says Georgi Angelov, director of the Pleven Automotive Vehicles Combine, "this year we shall assign an additional 40 trucks and 10 buses with a view to improving transportation services for the construction workers at this major project."

The construction of the Belene AETs is already becoming the concern and destiny of the steadily increasing number of construction organizations and thousands of workers and their wives and children. Construction and installation workers, investors, designers, drivers and auxiliary workers from all over the country are already arriving here. According to Soviet documentation and with the help of Soviet specialists, the second (but more powerful) AETs in our country will be built along the Danube River. It will produce and reliably dispatch the necessary electric power we shall be needing in the future.

5003
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NUCLEAR POWER PLANT PROPOSALS DRAW CRITICISM

Objection at LCY CC Session

LD211536 Belgrade TANJUG in English 1414 GMT 21 Feb 86

[Text] Belgrade, February 21 (TANJUG) -- At today's Central Committee session of the League of Communists of Yugoslavia (LCY) an objection was raised to the construction of new nuclear power plants in Yugoslavia.

LCY Central Committee member Dragisa Ivanovic, former rector of the Belgrade University, referring to the recent opening of a public bidding for the import of nuclear power plants, stressed that this decision should be revoked out of political, scientific-expert and financial reasons. He said that the construction of new nuclear power plants Yugoslavia would incur a 20 billion dollar debt, the figure practically equal to the country's present external debt.

In Ivanovic's opinion Yugoslavia has sufficient coal and water to cover its energy needs. The import of nuclear technology and fuel, Ivanovic warned, would be a blow to the country's independence, so that on such important decisions the broadest possible discussion should be organised.

Yugoslavia already has one nuclear power plant. For some time now the public has been asking more and more frequently whether the construction of new nuclear power plants is justified, in view of the fact that an ever growing number of other countries are giving up the use of nuclear energy for the production of electricity. A particular problem is the fact that a solution has still not been found where to store the radioactive waste.

Upholding the protection of human environment, delegates of the Yugoslav town Slavonska, Pozega municipality, yesterday rejected a proposal that the storage for the nuclear waste from the first nuclear power plant in Yugoslavia "Krsko" should be built in their district. The neighbouring municipality of Nova Gradiska recently took the same stand.

The clause on the protection of human environment has been included in the Yugoslav constitution and this is the first such instance in the world.

Public opinion polls carried out in 1980, 1982 and 1984 in the Yugoslav Republic of Slovenia where, on the border with the Yugoslav Republic of Croatia the a-power plant Krsko has been built, show that the number of those objecting to the construction of nuclear power plants in Yugoslavia is continually increasing.

'Disturbing the Public'

AU232129 Belgrade Domestic Service in Serbo-Croatian 1800 GMT 23 Feb 86

[Milutin Milenkovic "commentary" on the project of building nuclear power plants]

[Text] Now we are not going to observe the project of nuclear power plants from the point of view of economic and technological suitability, nor from the point of view of a danger to people and nature. We are not skilled to do that and do not want to take sides. Coming to us, however, are some specific and topical observations about a phenomenon that occurs very frequently, is noticed with reproach by most authorized sociopolitical or state factors, belongs to our domain, and is disturbing the public.

A milder or a stronger state of agitation on the part of the public undoubtedly belongs to so-called social pathology. As in the case of illness of any organism, the capability for a regular flow of all vitally important functions decreases in this fever; work suffers; neurotic confrontations, rage, and aggression amount; and it is not only the working energy and consciousness of an individual that suffer, but often also the health of the people who are caught in the net of unpleasant facts the solving of which they cannot directly influence.

Because of all this, upsetting the public is a socially harmful phenomenon, and the inciters of the phenomenon who act irresponsibily, maliciously, and from erroneous starting points bear, or should bear, legal consequences as well. Examples of such responsibility are many and almost all pertain to something that has been done in a way it should not have been done. There are almost no examples of responsibility demanded for something which has not been done and should have been, and a larger damage in public feeling ensued because of untimely information. or denial of information.

The debate at the latest session of the LCY Central Committee and the reaction to it in the broadest public have confirmed the fact that the public is more gravely upset as a result of failure to perform necessary actions. As a rule, it is easier to correct wrong information than to solve and repair the concealment of information.

When a LCY Central Committee member and a recognized expert for nuclear power reaches such a degree of upset and warning that he has to cry out from that forum's rostrum: Let us not allow a rope to be put around Yugoslavia's neck, then this is a situation which demands responsibility from those who created it.

The statement that Cimrade Milka Planinc, president of the Federal Executive Council, made at the same LCY Central Committee session had a calming effect to a certain extent. She said that this society, we quote, certainly will not allow solving the problem of nuclear power plants without a most serious debate, and so on. However, have not the stages of decisionmaking already gone too far without such debates being opened and the public being appropriately informed?

It is not strange that the nuclear topic is very much talked about in public these days, and that is done in a concerned and complaining way. And the words said by Comrade Ckrebic, president of the Presidency of the SR of Serbia, that such questions can be solved only by unified Yugoslav plans and by consensus is being used even for the appointment of any higher official of the federal administration, we will hopefully not allow the Adriatic, the currents of the Danube and the Sava, and other resources of which the whole of Yugoslavia and the health of all Yugoslavs depend, to be poisoned by any expert or economic-political group inspired at least by narrower interests.

We would therefore like to see in the statement made by the President of the Executive Council something more than an individual promise. This should represent an unambiguous obligation that really nothing be done in the application of nuclear power in the form of nuclear power plants without fully informing the public and without the deepest professional coordination.

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CSO: 5100/3021

YUGOSLAVIA

BRIEFS

AGREEMENT WITH SOVIET FIRM--Representatives of the SOUR (composite organization of associated labor) "Djuro Djakovic" in Slavonski Brod and the Soviet firm "Atomenergoexport" have signed an agreement in Zagreb on exporting about $20.25 million worth of nuclear equipment. Accordingly, "Djuro Djakovic" will deliver 11 complete sets of equipment for nuclear power plants in 1987 and 1988. Cooperation between these two firms began 10 years ago during which time over $168 million worth of equipment was delivered to "Atomenergoexport." [Text] [Belgrade PRIVREDNI PREGLED in Serbo-Croatian 25 Feb 86 p 12] /12947

CSO: 5100/3025

LEAK REPORTED IN CORDOBA NUCLEAR POWER PLANT

PY121504 Buenos Aires NOTICIAS ARGENTINAS in Spanish 1220 GMT 11 Mar 86

[Text] Cordoba, 11 Mar (NA)--The director of the Embalse Rio Tercero nuclear power plant, Eduardo Diaz, today revealed that a 3-week-old leak in one of the secondary circuits at the plant is allowing heavy water to escape in the direction of the lake. He added, however, that the breakdown "does not pose any danger to residents of the area or to the environment."

Diaz explained that the leak was detected approximately 2 weeks ago [as received], "but that it has not reached readioactive levels that would harm the environment." He said that "at this moment, these levels are equivalent to just 20 percent of the allowed minimum radioactivity levels set by the advisory committee for licensing nuclear facilities," which is the agency charged with granting licenses to and supervising operations at nuclear power plants.

The plant director also stated that this is a "common problem" in the operation of a nuclear power plant and that there are "contingencies for overcoming this type of breakdown."

Diaz explained that the nuclear power plant has three independent circuits through which different types of water circulate.

The primary circuit contains heavy water, the secondary circuit transports demineralized water, and the third circuit takes water from the lake to be used in the cooling system.

One of the 7,000 conduits through which heavy water is circulated at high temperatures suffereed a crack through which liquids are passing to the secondary circuit at a rate of 7 kg per hour.

Nuclear power plant technicians state that "that level is not concerning," although some of the water contaminated with radioactive elements is being leaked right next to the Tercero River, which is located some 150 km south of Cordoba where the nuclear power plant is located.

In turn, National Commission for Atomic Energy (CNEA) Chairman Pedro Constantini has sent a telex from Buenos Aires to the Cordoba Environmental Agency, stating that "the heavy water loss does not pose any risk to man or the environment," and that the breakdown "will be repaired within 10 days."

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CSO: 5100/2050

GOLDEMBERG URGES SUSPENSION OF NUCLEAR ACCORD WITH FRG

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 31 Jan 86 p 2

[Text] Professor Jose Goldemberg yesterday advocated before the Committee on Evaluation of the Brazilian Nuclear Program in Rio that substantial changes be made in the Brazilian-German nuclear agreement, to permit greater domestic participation in the sector. The rector of the University of Sao Paulo suggested that the country should abandon the idea of pursuing construction of the Angra-3 nuclear plant, and should continue the agreement with the Germans only up to completion of Angra-2, "and that, only because there is no choice."

"This idea that once project are begun they cannot be abandoned is not right," the professor said. "Now that the urgency in getting a nuclear program underway is over, we are ready to begin again." According to Goldemberg, to begin the nuclear program again on new bases would mean "building nuclear reactors in accordance with our needs." "Obviously this new project would be much more national," he added.

The USP rector said that the International Atomic Energy Agency itself advocates the use of small capacity reactors in developing countries. "Perhaps this is an opportunity for Brazilian industry," he commented. "As in the aviation industry, we are not building Boeings, but we are competing in the international market within the line we do produce." The professor brought from Sao Paulo the observation that "the national industry does not want to know anything about NUCLEP (Nuclebras Heavy Equipment), not in any color."

"We know that the project to build reactors in Iguape is on hold for an indefinite period of time, and this is a good opportunity to reconsider the future," he said. "We are going to complete the Angra-2 nuclear plant, because there is no other choice. Now, I would be very cautious with Angra-3."

Goldemberg disclosed that equipment purchases for the Angra-3 nuclear power plant already account for 60 percent of the total estimated, which, according to him, is customary for the sector, as it usually acquires equipment as quickly as possible to complete the projects. "This equipment we have already bought can be exported to other countries, and will help pay our foreign debt, which has built up in large part as a result of this nuclear program."

The USP rector said that the best course to follow would be to freeze the rest of the nuclear power, opening the way for greater national participation in the sector. "The next reactor to be built in Brazil should follow this principle," he concluded.

9805/12951
CSO: 5100/2044

REPORTAGE ON REEVALUATION OF NUCLEAR PROGRAM

Evaluation Committee Meeting in Sao Paulo

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 17 Jan 86 p 5

[Text] The 17 members of the Committee for Evaluation of the Brazilian Nuclear Program are meeting today at the Sao Paulo office of Furnas. The topic of the discussions was not revealed by the Ministry of Mines and Energy. "The work of the group is secret," according to Olberes Pizao, a ministry representative in Sao Paulo. The committee has been reevaluating Brazil's nuclear program since September of last year, when it was created, and has until March to complete its work.

A number of the committee's members has been in Sao Paulo since yesterday, including its chairman, Jose Israel Vargas, an advisor for nuclear affairs at the ministry. They were at the Energy and Nuclear Research Institute (IPEN) at the university "in a working meeting," according to reports by an official.

IPEN participates in the parallel nuclear program begun in 1982 by the National Nuclear Energy Commission, with the support of private enterprise. It is already producing hexafluoride from uranium and developing all the equipment and materials to produce gas on an industrial scale.

Members of the evaluation committee include businessmen, engineers, scientists and specialists in environmental protection, such as Jose Mindlin and Paulo Francini.

Complex Task Ahead for Evaluation Committee

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 16 Jan 86 p 5

[Text] The main lines of the revision of the nuclear program have not yet been defined, but as early as March President Jose Sarney will be receiving the final document from the committee of businessmen, scientists and experts in the nuclear field in charge of evaluating the German-Brazilian program and the parallel program conducted by the National Nuclear Energy Commission with a view to mastering full cycle technology.

Professor Jose Israel Vargas, chairman of the committee, said yesterday in Rio after a meeting at NUCLEBRAS that the work of the committee is quite complex, and that it intends to evaluate everything that has been done up to now in the nuclear field in Brazil, besides determining the role nuclear energy will play in meeting future energy needs, taking into account all the alternatives.

According to Jose Israel Vargas, they will make 30-year projections on the growth of the Brazilian economy, population, technological developments and the environmental impact of various forms of energy. Institutional changes to enterprises in the field, such as NUCLEBRAS and CNEN, will also be examined; but Professor Jose Israel Vargas is absolutely certain of one thing: construction of the Angra 2 and Angra 3 nuclear plants must not suffer any further interruptions.

Program

The committee evaluating the nuclear program met yesterday with the board of directors of NUCLEBRAS to examine technology and commercial contracts between that firm and the Germans. During part of the afternoon, the committee visited the Radiation Protection and Dosimetry Institute and met with the president of the National Nuclear Energy Commission, Professor Rex Nazare Alves.

Today the committee will be in Sao Paulo visiting the Nuclear Energy Research Institute (IPEN) and on Friday it will hold a plenary meeting at the regional office of the Ministry of Mines and Energy. At the end of the month, the committee will visit the Technological Aviation Center and will contact members of PROCON, which is an agency for protection of the nuclear program and includes members of the National Security Council, the Special Secretariat for the Environment (SEMA), the Ministry of the Interior and Civil Defense.

The committee is composed of the following persons: Alberto Pereira de Castro (ENGESA), Professor Caspar Erich Stemmer (Federal University of Santa Catarina), Eduardo Penna Franca (UFRJ), Fernando Claudio Zawislak (UFRS), Jose Ephin Mindlin (Metal Leve), Jose Lameira Bittencourt (IBQN), Jose Israel Vargas (Ministry of Mines and Energy), Jose Leite Lopes (Brazilian Center for Physical Research), Jose Pelucio Ferreira (PUC), Jose Wanderley Coelho Dias, Luiz Augusto de Castro Neves (National Security Council), Luiz Renato Caldas (UFRJ), Marcelo Damy de Souza Santos (PUC-SP), Oscar Sala (USP-SP), Paulo Francini (Coldex), Ramayana Gazzinelli (UFMG) and Roberto Rodrigues Krause (Ministry of Foreign Affairs).

9805/12795
CSO: 5100/2039

NUCLEAR REEVALUATION COMMITTEE VISITS FACILITIES

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Jan 86 p 5

[Text] The Committee for the Evaluation of the Brazilian Nuclear Program will not announce the results of its work before 19 March, when the 180-day period for it to complete its work has lapsed. "Reporting partial conclusions could generate unnecessary rumors," according to the committee's executive secretary, Jose Mauro Esteves dos Santos.

Jose Mauro said evasively that the committee, which met yesterday at the Sao Paulo office of Furnas, was discussing "at the time" the parallel nuclear program developed with the support of private enterprise. But he later corrected himself: "There are not two programs, one official and the other parallel, but it is all part of a single nuclear policy."

The committee visited the Institute for Nuclear and Energy Research (IPEN) in Sao Paulo, which is already producing uranium hexafluoride gas under the parallel program. "We went to IPEN and everything was explained to us with no secrets," Jose Mauro said, adding that the committee would also make a study of this visit.

He quickly reviewed the work of the committee since it was set up in September of last year: 5 plenary meetings (with 20 members participating--12 persons appointed by various sectors of society, 5 representatives of governmental institutions, and 3 observers from ministries); 5 working groups formed "to examine in detail various aspects of nuclear energy;" 20 technical memoranda; visits to nuclear facilities; and consultations with the community and meetings with leaders and experts from firms involved in the nuclear field.

At the end of its work, the committee is supposed to submit a report to President Jose Sarney proposing aid for a new Brazilian nuclear policy. "Criticism and suggestions from the public which have been sent personally or through documents will be included in the final report." The committee also intends to consult with the Brazilian Association for the Advancement of Science and the Brazilian Physics Association.

Work plans also include meetings with the Institute for Advanced Research of the Technical Aerospace Center in Sao Jose dos Campos, the Nuclear

Engineering Institute in Rio and NUCLEN. According to Jose Mauro, the committee intends to acquaint itself with all Brazilian nuclear facilities.

During these 120 days of work, the committee visited the Pocos de Caldas Industrial Complex, where uranium is produced and refined; the Resende Industrial Complex, which processes part of the manufacture of fuels and where construction of the first cascade of Nuclebras' Isotope Enrichment Plant is in its final stages.

The committee also visited the Angra 1 Plant, the work sites of Angra 2 and 3, the Institute for Energy and Nuclear Research, the Radiation Protection and Dosimetry Institute of the National Nuclear Energy Commission, and Confab Industrial and Nuclebras Heavy Equipment, both involved in manufacturing major components for the plants, as well as the Center for Development of Nuclear Technology in Belo Horizonte, which primarily conducts tests of nuclear components and refines ore from Itataia, in Ceara, on a pilot basis.

Jose Mauro indicated that during the visits, "extensive discussions with experts from each institution were held." The committee met with leaders of the National Nuclear Energy Commission, Nuclebras and its subsidiaries, Electrobras, Furnas Centrais Eletricas and the Sao Paulo Energy Company. "At these meetings, the committee learned of the problems in the nuclear sector from the standpoint of each enterprise."

According to Jose Mauro, the committe is tackling the nuclear issue from three basic standpoints: the role of nuclear energy in domestic demand, the technological aspect ("and its ramifications in the social, industrial and scientific spheres") and environmental aspects. "These combined studies should suggest new options in different areas related to nuclear energy." These would include the creation of a standard for activities in keeping with the domestic reactor industry and the cycle of the fuel. "We may also suggest a technological program compatible with uses which have also suggest a technological program compatible with uses which have an economic impact, in addition to an appropriate manpower program." And even an "operation model" for the nuclear program.

"To get the views of all segments of the community involved in the nuclear question," Jose Mauro said that various entities were consulted, including the Brazilian Association of Basic Industries and the Brazilian Association of Engineering Consultants.

Participating in the committee are university professors, scientists and business executives such as Jose Mindlin and Paulo Francini. Its chairman is Professor Jose Israel Vargas, advisor for nuclear affairs at the Ministry of Mines and Energy.

9805/12951
CSO: 5100/2944

FUND SHORTAGE AFFECTS NUCLEBRAS PROGRAMS

PY221432 Brasilia Radio da Amazonia Network in Portuguese 0900 GMT 22 Feb 86

[Report by Antonio Carlos]

[Text] Nuclebras [Brazilian Nuclear Corporations, Inc] President (Mecias Ceabra) yesterday stated that the energy supply in the southeastern and south-central regions of the country may be affected in 1992 if Nuclebras programs are not finished within the established schedule because of the shortage of funds. This situation also affects the ANGRA II and ANGRA III nuclear plants, which are included in the Eletrobras [Brazilian Electric Power Companies, Inc] electrical system budget and which are scheduled to be operating by 1992 and 1995, respectively. In addition, programs will be rescheduled and, consequently, more funds will be needed, (Mecias Ceabra) explained. [recorded passage indistinct]

About $2 billion must be invested to finish building the ANGRA II and ANGRA III Plants. Once in operation, the two nuclear plants will produce 2.6 million kilowatts. A task force that was established this month is presently studying the budget that has been allocated to finish the construction programs within the established deadline. This task force is made up of members of Seplan [Secretariat of Planning], the Finance Ministry, and the Mines and Energy Ministry. The study must be concluded by the end of April.

/8309
CSO: 5100/2046

BRAZIL

URANIUM SHIPMENT SENT TO ANGRA-1 PLANT

PY081818 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 5 Mar 86 p 30

[Text] Rio de Janeiro -- The first uranium shipment to refuel the Angra-1 reactor, estimated at $40 million, was handed over yesterday by the Brazilian Nuclear Corporation [Nuclebras] to Furnas [Furnas Electric Power Plants, Inc.] The shipment was transported in several trucks protected by vehicles of the military police, the highway patrol, and the fire department. The security on the stretch of highway between Resende and Itaorna beach was unprecedented. This fuel will replace one-third of the uranium already burned in the Angra-1 reactor. It was partially produced in Resende.

In fact, this fuel element, or uranium pellets, were only enclosed at the Nuclebras fuel elements plant. The natural uranium extracted from Poco de Caldas has yet to make the long trip abroad to be enriched, going first to France where it is converted in the Pechiney plants into uranium hexafluoride (UF-6). Then the uranium is sent to Urenco, in England, where it is enriched, and then taken the FRG to be synthetized and turned into pellets before it arrives in Resende, where it is placed in the zircaloy rods from Argentina.

Although Brazil has invested $30 million in the fuel factory and $280 million in the pilot plant for enriched uranium, the country is taking its first steps to absorb and master the technology of the fuel cycle. The investments were postponed due to delays in the nuclear program, and progress during the last 3 years was practically nil. The fuel elements factory has achieved almost nothing since 1983. To keep from being idle, it has begun to manufacture precision components for Boeing and the Brazilian Aeronautics Company (Embraer) for the Tucano and AMX planes.

The pilot plant for the "jet-nozzle" [preceding words in English] uranium enrichment process requires an investment of $20 million to start the first series of associated condensers with 24 pages. This first series of condensers is one unit for a 400-stage industrial plant. Each stage is composed of a huge compressor, a heat exchanger, and a chember with the elements for Uranium 235 separation.

Technicians of the Brazilian Nuclear Corporations, Inc (Nuclebras) have reported that even if the technological problems associated with this process are overcome and it can successfully produce enriched uranium at an industrial rate, rather than just a laboratory level, this uranim enrichment plant would still be extremely costly. Its productive unit, called Isotopic Separation Unit [Unidate de Separacao Isotopica -- UTS], will cost $450 compared to the $150 [figures as published] Urenco charges Brazil for the same service. The international market for enriched uranium is saturated with offers, and the United States has announced that it will put its laser-enriched uranium plant into operation this year, charging $80 per UTS.

The Nuclebras technicians believe it is absurd that the country has invested $280 million in constructing the pilot plant and is now considering suspending the plan for lack of $20 million. They are certain that the process can produce enriched uranium at industrial levels, but they must know if it offers an effective control system, if the series of associated condensers can work at a steady pace, how much energy will be used, the necessary level of redundancy, and how the central systems must be composed, besides obtaining data on the separation of UF-6 through hydrogen.

If the government decides to grant the remaining $20 million required to carry out the project, which seems to be the most reasonable alternative, the above questions will only be answered in 1988, when the government will receive a report appraising construction of an industrial plant costing DM2 billion, or almost $1 billion. In any case, the Nuclebras technicians defend continuing construction at the enriched uranium plant. Work at the Resende industrial nuclear complex, meanwhile, is semi-paralyzed.

/6091
CSO: 5100/2047

BRIEFS

APPOINTMENT TO CNEN--President Jose Sarney yesterday appointed the president of the Votorantin Group, Antonio Ermirio de Morais, to the Deliberative Committee of the National Nuclear Energy Commission (CNEN). The CNEN is the regulatory agency for the national nuclear sector and is also involved in technological training and development for the country in this area, reviewing and paying royalties to domestic private companies involved in all aspects from manufacturing radioisotopes to nuclear medicine and sterilization equipment. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 22 Jan 86 p 28] 9805/12795

CSO: 5100/2039

CHILE

NUCLEAR EXPERT CRITICIZES GOVERNMENT POLICY

PY142243 Santiago EL MERCURIO in Spanish 10 Feb 86 p C 3

[Excerpts] "If Chile had an adequate policy in the nuclear energy field, it could develop an adequate infrastructure to meet the domestic energy consumption demands. The necessary manpower could be trained in a short time, a task that is currently being fully undertaken by the University of Chile." This statement was made by Carlos Infante upon the conclusion of a course called: "Nuclear Physics: Basic Research and Applications." Infante is an academician at the University of Chile, Faculty of Science.

Infante said that "Chile possesses the La Reina nuclear reactor. It would be very useful to maintain it. Presently, only 10 percent of its capacity is being used because it is felt that this is sufficient. In this regard, an adequate policy is lacking in our country." Dr Infante added that "in 1984, the average energy consumption in Chile reached 1,500 megawatts and with two large reactors (because this is the only way to lower the costs) these needs will reportedly be met. The energy consumption increase during certain hours in winter justifies the installation of a nuclear reactor. This is something that will be reviewed in 1990."

The review of this problem is justified by the high cost incurred in meeting energy demands which "are currently met by operating the Renca and Quintero thermoelectrical power plants. However, these plants produce energy at a very high cost because they are mainly operating on petroleum. This could increase the need for a reactor," Infante said. The reactor in the La Reina Research Center is currently being used for industrial and medical purposes, making it a leading center in these fields in Latin America.

/9738
CSO: 5100/2045

IMPORTANCE OF NUCLEAR ENERGY TO BANGLADESH DEVELOPMENT

Dhaka THE BANGLADESH OBSERVER in English 2 Feb 86 p 5

[Editorial]

The sources of energy are numerous. Some countries depend on fossils like coal and oil. Others use solar. water. gas, biogas and wind sources. Yet others are found using the fission and fusion process for getting energy. Nuclear energy is quite competitive in terms of cost and efficiency. It may also keep the environment clean if waste is buried properly as in developed countries. In a way nuclear energy is better than oil and coal, because the scope of environmental pollution is relatively wider in the latter cases. While fossil sources are not unlimited, renewable sources of energy like wood, for example, are also difficult to get. Whatever be the sources. Bangladesh badly needs to increase the availability of energy, if a breakthrough is to be achieved in development.

Experts say that developing countries need more of energy than the developed ones. This is so because of the fact that the latter have attained better efficiency in the use of energy. That being so, more and more energy is needed if more and more units of production and larger operations are to be ensured by motive power. A change-over from manual to motive power is an essential condition for growth and development. If all the boats were to be propelled by engine, for example, in preference to currently used boatmanship, the results in terms of river transport will be tremendous. So will be the case with the manually pedalled rickshaws. In the field of agriculture and industry a revolution could be expected to happen once we have larger and cheaper supply of energy. It is imperative therefore for the policy-makers to look for the alternative sources of power.

Nuclear energy is needed more by countries like Bangladesh where alternate natural sources are extremely limited. This is why the Atomic Energy Commission was set up in the sixties and it was expected that it would explore other sources of energy and provide skill and know-how for the Ruppur Nuclear Plant. It may be pointed out that the AEC has done some good work in the area of crop-development and crop-protection through nuclear research, but its contribution to development of nuclear energy is as good as nil. As for the Rupper Nuclear Plant it has become more a liability than an asset, as periodical reports suggest. Obtaining energy from nuclear sources therefore remains still a far cry in spite of all the sunk cost.

Those in authority should take lessons from developed countries and adopt policy of exploitation of nuclear energy side by side with exploiting the conventional sources. When countries like France Sweden and the USA use nuclear energy as an alternate source despite their having huge known reserves of coal, oil and gas, Bangladesh should not depend either on its known gas reserve or the imported coal and oil. Experts indicate that with the abundance of silicon and sun-shine Bangladesh could explore the possibility of using them for the generation of chemical and solar energy. The solar cooker is clearly a substitute for domestic gas and electric connections. Likewise nuclear energy could work as the pivotal source of power in addition to gas, hydro-electric and thermal power. With the demand for energy increasing it is time that Bangladesh went for nuclear energy in a big way.

Obviously nuclear energy is a high-technology proposition. The Atomic Energy Commission should have by now trained up the personnel needed for installation and operation of nuclear plants. Quite a substantial amount of resources has been spent on training our nuclear physicists and technologists. They need to be put to work, by obtaining and installing necessary equipment. The wastage involved in keeping the trained manpower idle would be far larger than the projected cost of installation. The conventional sources of energy being limited the opportunity cost of installation for nuclear plants would be favourable. For this a thorough review of the energy sector is called for.

The task should therefore be entrusted to duly qualified and dispassionate experts. The work initiated in the sixties should be taken to its logical end with a view to utilizing the nuclear energy as an alternate source of tremendous possibilities. The need is felt in all well-meaning quarters including the UN, whose Adviser on Energy suggested to a select gathering in Dhaka in May last year that with appropriate and environmentally benign technology various sources including nuclear fission and fusion should be brought into use for meeting the upcoming demands for energy in this country.

BANGLADESH

BRIEFS

BAEC TWIN PROGRAMS--The Chairman of Bangladesh Atomic Energy Commission (BAEC) Dr Anwar Hossain said in Dhaka on Friday that the Commission was now engaged in the twin programme of application of radio-isotopes and radiation sources in agriculture medicines food preservation hydrology and industry and introduction of nuclear power in the country reports BSS. He was speaking at the inaugural function of a 3-day seminar on "Industrial Traces Application" which began at the auditorium of BAEC according to a press release. About 30 participants from 15 organisations of the country are taking part in the seminar organised jointly by International Atomic Energy Agency United Nations Development Programme and BAEC. [Text] [Dhaka THE BANGLADESH TIMES in English 2 Feb 86 p 3] /13104

GIFT FROM IAEA, USSR--Bangladesh Atomic Energy Commission will install a food irradiator in Chittagong with the cooperation from Beximco Bangladesh Ltd. The one million dollar irradiator has been offered by the International Atomic Energy Agency (IAEA) under its technical assistance programme. The irradiator will be supplied by M/S Techsnabeport of USSR, according to a Press release of Bangladesh Atomic Energy Commission. [Text] [Dhaka THE BANGLADESH OBSERVER in English 31 Jan 86 p 10] /13104

CSO: 5150/0070

EGYPT

AL-DAB'AH PLANT DELAYED

London MIDDLE EAST ECONOMIC DIGEST 8 Feb 86 pp 11, 12

[Text] The government has decided to press ahead with the nuclear power programme, it is understood. But it is as yet unclear what is to be done about specific plans to build the first power station at Al-Dabah west of Alexandria.

The three contenders for the contract in late 1985 were invited to extend the validity of their offers to 25 February — bids were originally submitted in November 1983. Industry observers say it will be hard for the bidders to renew their financing offers if the client requests another extension (MEED 26:10:85).

The three groups bidding are West Germany's ***Kraftwerk Union (KWU)***, the US' ***Westinghouse Electric Corporation*** and a Franco-Italian consortium led by France's ***Framatome***. KWU and Westinghouse are offering to build a single 1,000-MW unit; Framatome has proposed a twin-unit plant, with total capacity of 2,000 MW. The cost is estimated at about $ 1,100 million-1,300 million for each unit.

Pledges for financing and export credit cover have been obtained for 85 per cent of the foreign currency portion of the various offers. The French and Italian governments have agreed to back Framatome's bid; KWU's financing involves West Germany and several other European countries; Westinghouse, heading a multinational consortium, has arranged finance from the US, Japan, Spain, Belgium and the UK.

Cairo observers say they expect the ***Nuclear Power Plants Authority*** to award one, two or even three letters of intent by 25 February. This would be followed by lengthy discussions with the bidders — possibly lasting two or three years.

The desirability of going ahead with the Al-Dabah station has been questioned in government circles in recent months. There are doubts as to whether Egypt can afford to proceed with such an expensive scheme in the present depressed economic climate. Critics note that the fall in oil prices has lowered the cost of conventional power generation. And the Egyptian Electricity Authority has drawn up plans to install more than 2,000 MW of coal-fired capacity by the early 1990s (see below).

In the light of these factors, the reported decision to go on with the nuclear programme is seen by industry observers as a decision not to cancel Al-Dabah just yet, rather than as a firm sign that the project will go ahead.

/12851
CSO: 5100/4606

PAKISTAN

BRIEFS

U.S. AMBASSADOR CITED ON NPT--The U.S. ambassador to Pakistan, Mr Dean Hinton, has asked Islamabad to sign the nuclear nonproliferation treaty. In an interview with the Pakistan paper JANG, Mr Hinton expressed doubts about Pakistan's atomic program. He said if Pakistan wants to pursue its nuclear program for peaceful purposes, it can get more aid from the United States and other countries. [Text] [Delhi Domestic Service in English 0830 GMT 2 Mar 86 BK] /6662

CSO: 5100/4137

SOUTH AFRICA

POISON FEARS DELAY WORK ON POWER STATION

Cape Town WEEKEND ARGUS in English 8 Feb 86 p 7

[Article by Tom Hood]

[Text] FEARS about possible asbestos poisoning are delaying arrangements to demolish Cape Town's Table Bay Power Station.

Tenders for the demolition of the old power station were recalled and stringent requirements inserted for the removal of highly toxic asbestos.

The new tenders were re-issued this week, with a closing date of March 6, the city's electrical engineer, Mr D C Palser, said.

Power stations contains large amounts of blue asbestos used in lagging pipes for insulation and covering beams for fire protection and Escom has been investigating ways of removing asbestos, dust from which could cause a fatal lung disease.

Strong wind

Health experts fear a strong wind on the city's Foreshore could spread deadly asbestos dust over the central city unless there is strict control during removal of plant from the power station.

Mr Palser said the tenders were reconsidered in the light of new legislation proposed for the handling of asbestos.

"We have made more inquiries overseas and after discussion with the medical officer, Dr Reg Coogan, it was felt we should tighten up the specification, placing particular emphasis on this potential health hazard and the careful removal of asbestos when plant is dismantled."

Health authorities have pressed for tighter control over handling asbestos. Draft legislation was published in October and the Department of Manpower wants to get this promulgated this year.

Heavy fines

Partly based on American experience, it will lay down heavy fines where employers do not provide adequate breathing masks, protective clothing that is burned immediately after use and machines to suck up dust.

Asbestos waste, coming in increasing quantities from recycled and demolished buildings, will also have to be stored in deep holes in the ground and treated as carefully as radioactive waste from nuclear power stations.

There is a world-wide campaign against the often-fatal asbestosis, caused by inhaling asbestos dust.

As in other countries, owners of a large number of South African factories and other buildings could be forced by legislation in the next 10 years to de-gut their buildings of friable asbestos.

Part of the Voortrekker Monument in Pretoria is already closed to the public while workmen remove defective plaster containing asbestos fibres.

A large office block in Bellville was recently de-gutted of asbestos plaster and each room had to be sealed off.

However, some health authorities are worried that pressure to force property owners to remove ageing friable asbestos could lead to backyard operators entering the field — "the familiar team including unskilled labourers with a sledgehammer and wheelbarrow."

A Cape expert on handling asbestos, Mr John Barratt, managing director of Macamin W P, part of the Fred Whitehead group, said: "If amateurs become involved in this work they will eventually contaminate their workforce and possibly other people working or living near the site and even cause their deaths through asbestosis, mesothelioma or lung cancer."

Mr Barratt said the danger is that inexperienced operators could be awarded contracts because they were able to undercut the professional operators by not observing all the necessary precautions.

Lung diseases caused by particles of friable asbestos in the air often took 15 to 30 years to become apparent. An unprofessional contractor therefore could get away with malapractices for a considerable time unless he was monitored.

● Building contractors are to be given advice about safe ways of removing old asbestos on March 20 at a seminar in Cape Town. Speakers include the president of the largest asbestos stripping company in the United States and South African medical and industrial executives with experience of asbestos.

/12828
CSO: 5100/16

DISCUSSION OF SOVIET NUCLEAR POWER AID TO CUBA

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 31 Dec 85 p3

[Article by N. Lukina, senior instructor for Sverdlovsk City Institute Foreign Language Department, Havana-Sverdlovsk: "Cuba's Atoms of Peace," passage in ALL CAPS printed in boldface]

[Text] **TOMORROW THE CUBAN PEOPLE NOTE THEIR NATIONAL HOLIDAY--LIBERATION DAY**

The first thing you notice when approaching the construction site for the "Juragua" nuclear power station is three large tents. They stand along the road at the edge of a large field sown with stiff jute "cacti." On each tent were some of these words:

"Soviet and Bulgarian friends
Are helping Juragua Granma
Meet its 1 January goal!
Fidel Castro!"

More than a quarter of a century has passed since the yacht "Granma" landed the revolutionary assault on the eastern end of the island. It was a small spark from which the flame of the liberation struggle blazed up in the Sierra Maestra Mountains and then went down from the mountains to the capital. The history of free Cuba began on 1 January 1959. The Cubans have linked the construction of the nuclear power plant on the Island of Freedom with the name of the legendary yacht.

In order to defend and strengthen its independence, the titanic efforts of the Cuban people and support of its friend have been required. Among all the types of aid which have been given by friendly countries to the Island of Freedom, the deliveries of crude and fuel oil have been of special significance. Cuba is poor in energy sources and there are no deep or fast moving rivers. No large reserves of oil have yet been found, and the energy in the ebb and flow of sea tides is insignificant.

It is for this reason that 17 April 1960, the day a Soviet tanker with oil arrived in Cuba, can be considered the beginning of a historic era in the nation's energy. Since that time deliveries of Soviet oil have grown every year. Our country has given Cuba a great deal of aid in locating reserves of mineral fuel and training cadres of geophysicists and geologists. Until now electrical power stations using imported fuel were built with the technical cooperation of the Soviet Union and are now in use. Saving fuel imported from overseas was a large and acute problem for Cuba. "All types of Cuban industry require electricity and the requirement is becoming greater and greater. It is specifically for this reason that today it is all the more necessary for us to conserve electricity," said the head of the Cuban government, F. Castro.

Building nuclear power plants is the way by which it will be possible for the country to solve its energy problems. Speaking at a forum on Cuban power, Fidel Castro presented the expressive figures showing the economic factors in constructing a nuclear power plant: If 40 tankers with a capacity of 25,000 tons are required to import 1 million tons of oil, then to transport 2.5 million tons (the amount of fuel that will be saved by a nuclear power plant in 1 year) would require 100 tanker trips.

...On the desert shore the steel and concrete structure rose. Tall cranes lift the parts for assembly. On the construction site where equipment is being operated, one can hear Russian and Cuban Spanish. This is the way the construction of the first nuclear power plant in Cuba, the third in Latin America, is today. Soviet and Cuban specialists came to this quiet land in November 1981. The chief of drilling and blasting, B. Grigorchuk, arrived with the first load. He remembers very well 18 January 1982 when the first peaceful explosion raising a cloud of red dust rumbled here. Then they began to excavate the foundation area and lay the first cubic meter of concrete for the reactor building foundation.

"It was hard," said B. Grigorchuk. "A tropical climate and an unfamiliar Spanish language made the work more difficult. But now much of this is behind us."

Many difficulties fell to the Soviet specialists V. Balay and B. Kotenko. During the removal of the first geodesic areas, it was necessary for them to contend...with impenetrable growths of clinging and vicious bushes, the name of which in Spanish sounds kind enough--"Murava." Training the Cuban "counterparts" (working partners) was not easy. Those with whom it was necessary to start from the very beginning are now independently solving complicated topographic problems and skillfully using the tools provided by the Soviet Union and other countries. A majority of the Cubans who have construction specialties are prepared to become power station employees and work at the nuclear power plant here in the future.

Among the Cuban specialists there are many who have been trained in our country. In our first days of work at the construction site, I attempted to translate the advice of our specialists for the Cuban foreman, J. Nestor. The foreman laughed and in almost perfect Russian said that he did not need my help: He had studied and done an internship in the Soviet Union and had learned our language very well.

Many good traditions of the Soviet people have become well adapted at the construction project. It was necessary for us, the Soviet specialists, to participate in an international subbotnik. Together with the Cubans we picked yucca, oranges, tangerines and lemons. The subbotnik was converted into a holiday of labor and international friendship. The work was done with inspiration while singing and telling jokes.

The Soviet specialists and the Cuban builders completed an agreement for an international competition, the results of which are posted here regularly. In this agreement there are points on the joint search for more economic methods of construction, the preparation and study by Cuban specialists of leading examples and the best experience in building nuclear power plants and for savings by realizing technical recommendations.

No small experience has been gained here. New specialists building the Beloyarsk, Voronezh, Zaporozh, Kursk and other nuclear power plants in the USSR visit the construction project because of the construction and assembly. In 1984, the Bulgarian Specialist Brigade imeni F. Castro arrived. In it were 82 people, the same as were on the yacht "Granma" who lit the revolutionary fire in Cuba. The Bulgarian builders built houses, dormitories, stores and other nuclear city facilities. Ahead are a sea of things to do, but at the "Granma Juragua" there is a reliable team and no one doubts that the nuclear power plant will meet its 1 January goal.

12747
CSO: 5100/9

BRIEFS

CEMA NUCLEAR INSTRUMENT COLLECTIVE--Instruments using peaceful atomic energy may be found in research laboratories where people are penetrating the secrets of matter and in the shops of large factories, in Antarctica and in space, among the equipment of geological search parties and in a doctor's office. Scores of "intelligent," high quality instruments and devices responding to the peaceful scientific-technical level are now being displayed in the "Expocenter" halls which are in the Moscow Sokolniki. Here, there is a special display of the international economic association for nuclear instrument building--"Interatominstrument." This organization with its center in Warsaw was created in 1972 in order to fully satisfy the growing demand by the socialist countries for peaceful atomic equipment and strengthen integration. Now it operates under the principle of cost accounting and already several years ago went to full self-repayment. The members of the association are 16 enterprises and international trade firms from the PRB [People's Republic of Bulgaria], HPR [Hungarian People's Republic], GDR, PPR [Polish People's Republic], USSR and CSSR which provide for export and import of nuclear equipment. "The atom is for peace: that is the main idea of our work," said Miroslav German, the association director. An important part of the activity of "Interatominstrument" is service. It is made of branches located in the cities of Pleven (PRB), Dubna (USSR) and Zelena-Gura (PPR). Here is where they conduct warranty and other services on equipment and design, assemble and produce instruments. [By L. Chausov] [Excerpts] [Moscow PRAVDA in Russian 17 Oct 85 p 5] 12747
CSO: 5100/9

SPAIN

CONSTRUCTION OF TRILLO, VANDELLOS NUCLEAR PLANTS CONTINUES

Madrid LUZ & FUERZA in Spanish Jul-Aug 85 pp 5-11

[Text] In early July, upon his return from the AIE [International Energy Agency] meeting in Paris, Martin Gallego, Spain's secretary of energy, made some statements which were then disseminated by the media.

He was quoted literally by the press on 11 July, to the effect that "the PEN [National Energy Plan] still has too much oil in it," and that our nation "must use these bonanza years to catch up its accumulated backlog in relation to the energy situation of the EEC countries and of the rest of the AIE members."

That opinion--exactly what we have been saying in all of our repeated and perhaps overly repetitious commentaries in LUZ & FUERZA on the new National Energy Plan--has over our personal view the dual advantage of coming from a very high level official in Spain's energy field, and secondly, for that very reason, we assume that it is backed up by very up to date and accurate figures and statistics, and not by the more or less obsolete data provided with delays and many corrections that are so often found in government publications.

Such a singular agreement in our views would certainly seem bound to please us, as we suspect it will so many thousands of interested onlookers and participants in the energy sector, who for years have had their doubts about the wisdom of hydrocarbons as a source of energy production, in comparison with other technologies. This really isn't a very abstruse conclusion. We need only a good budget summary of our foreign balance of payments, plus a simplified analysis of the kw/hour costs entailed in the various methods of producing energy.

And let us say that this statement does please us, for it shows that our officials and authorities have finally managed to cut through the Gordian knot and have seen the truth. Which is, that while the wealthier members of the EEC are all together reducing their dependence on oil to about 54 percent--and we don't even want to mention some, like France, which is on the verge of winning the battle--for Spain, oil still provides 69 percent of our final energy supply.

The secretary of energy, we learned from the news reports, gave the future keys for a solution, based substantially on the following principles: "to stimulate the development of our own resources and heighten the tax advantages for the use of water resources." That seems great to us, though we doubt its efficacy, given the shortage of such resources in our subsoil and the saturation of our water potential on the surface. Another key: "the development of our own natural gas fields." (We prudently inserted the adjectives "our own" here, since without that clarification, the reader might interpret this to mean "foreign" gas fields, because of the magnitude of our scheduled purchases from Algeria). And in the end, "the development of coal mining with an eye toward profits." This still doesn't mention that phrase, though, so it avoids irritating some of our regular South African and far distant Australian suppliers. This "eye toward profits" is an idea that, in our opinion, is much easier to say than to put into practice. Let them tell that to the mining companies, which are today bogged down in the most critical and conflict-ridden sector of our nation, which are overburdened with a thousand reconversion projects, measures promoting economic health, and recovery programs--all of them apparently useless, if we are to judge by the limited fruits they produce.

In his remarks, Martin Gallego said nothing about the atom as an outstanding weapon in the war against energy dependence on foreign sources. There was not the slightest allusion, we learned from reading the papers which reported his statement, to a topic that appears to arouse great misgivings in our leaders, and to which they systematically avoid the slightest reference. This is surprising in an obviously well informed official, particularly as he had just returned, not from Lusaka, but from Paris: the capital of the world's second greatest power in nuclear electricity production.

Finally, we who do believe in the atom, who have confidence in its safety, and understand the vital role it must play in our energy future, will devote the following paragraphs to a short synopsis of the two--and it now seems the last--of our nuclear power plants for the near future, with their powerful atomic hearts which will pump blood to the arteries of industrialized Spain.

Trillo I

Trillo I is located in Guadalajara province in an area known as "Cerrillo Alto" belonging to the municipality of Trillo in the Alcarria region. This is a "third generation" plant (unlike the Cofrentes plant which, along with Almaraz, Asco, and Lemoniz, make up the history of nuclear power plants in Spain). Its reactor has highly advanced features, as does the design of the entire plant, which uses European technology (similar to Germany's Neckar Westheim plant, which has been in operation since 1976). The plant's major pieces of equipment--the pressure container, steam generators, pipes, pressurizer, etc.--were made by Spanish industries.

Like the Cofrentes plant and the second Almaraz, Asco, and Vandellos units, its completion and start of service were authorized under the new Energy Plan, a fate that was not shared by many other plants, which were cancelled or whose construction was paralyzed under this program (Lemoniz I and II, Valdecaballeros I and II, and Trillo's Unit II), to the dismay of our long-suffering heavy equipment sector and to many of the companies that own them.

After careful preliminary studies, factors of a technical, economic, geologic-geographic, and human nature were all considered in determining the site of this plant, while weighing the suitability of such a huge and vital investment.

Its proximity to large populated areas and expanding industrial regions (Madrid, Guadalajara, Alcala de Henares) with a great potential for consumption, the economically disadvantaged nature of this area and the need to provide job incentives that will enable its natives to return (for many years, and in increasing numbers the local people have migrated to other more fortunate areas to find jobs), the plentiful water supply provided by the Tagus River and other rivers in the area, and finally, the solidity of the terrain chosen in an area almost free from any seismic dangers, all combined to decisively settle the selection of this plant's site.

We won't dwell here on the plant's technical features, which have been amply described in other articles appearing in this publication, nor on the extensive investments devoted to safety (approximately a third of its cost), with redundant and independent systems with up to four automatic redundancies in the areas requiring maximum attention. In reference to the latter point, we will only mention that all of the plant's components comply with the requisite international standards, and have been approved by the IAEA [International Atomic Energy Agency], an agency of the United Nations.

Some Chronological Stages in Construction

December 1984. Construction of the plant's ventilation stack continued. This is a reinforced concrete structure with a circular section, and with its superstructure in the form of a truncated cone. When the stack is completed, it will have three different parts: the lowest part, consisting of the foundation slab and the first segment of the truncated cone, and the two upper parts, two superimposed truncated cones. Its total height will be 100 meters. Its fundamental purpose is to provide ventilation for the plant's various buildings. Its completion is scheduled for April of this year. In this structure, 150 tons of reinforcement, 1,700 m^3 of concrete, and 3,300 m^2 of forms were used.

In December 1984 the assembly of the plates, bases, and housings for the bearings that will provide support for the axis of the plant's turbine-alternator began. These components rest on a bed or pedestal of reinforced concrete, which in its turn is supported on 91 elastic structures composed of springs.

January 1985. The third and last of the steam generators arrived at Trillo I during this month. The steam generators will be housed in the plant's reactor building. At the same time, work progressed on the control room, positioning and leveling the framing for the various panels needed in this room.

February 1985. Construction of the diesel building is nearing completion; 1,300 metric tons of reinforcement, 7,300 m^3 of concrete, and 10,800 m^2 of framing were used for this building.

At the same time, the electronic panels were being installed in the computer room, located in the plant's electrical building.

March 1985. Work on the roof of the turbine building is nearing completion. In addition, the final touches are being put on the vertical walls of this building. The area under cover is 3,860 m^2, while the area of the vertical facades will be 8,861 m^2.

April 1985. The supports for the condensation system, which has 44 casings composed of two springs each, located under the shafts of the condensation system, are being readied for final installation and positioning. The pipework is also nearing completion. This consists of installing over 62,000 titanium alloy pipes for this condensation system. At the same time, the electrical power line that will connect Trillo I with the Loeches substation has been authorized.

May 1985. Concrete work for the hemisphere that will cover the reactor building's metal sphere is beginning. This structure will use 10,700 m^2 of framing, 4,300 m^3 of concrete, and 830 tons of reinforcement.

June 1985. The three rotors for the plant's low pressure chambers are being installed. These turbine revolution devices are 9 meters long and 3 meters in diameter. Each of them weighs 86 tons.

July-August 1985. The installation of the pipes making up the plant's primary circuit is now being completed. The total number of manhours required was 26,000, although we should note that this work, which took 5 months for the assembly and welding of this complex system of pipes, was extraordinarily short, when compared with the normal amount of time required for the construction of similar plants.

At the same time, a number of tests were conducted of the demineralization building, as well as of the instrumentation and control panels and local command posts for this building.

Present Status of the Project (as of 31 August 1985)

1. Civil engineering: 95 percent of the concrete work scheduled has been completed. Finishing touches will be added as needed, after the equipment has been installed.

2. Primary system: installed.

3. Heavy equipment: installed.

4. Pipework: Over 50 percent of the pipes have been installed.

5. Ventilation: Over 80 percent has been done, and finishing work is being done in the main areas.

6. Electrical installation: Over 60 percent of the total length of the wiring has been installed.

7. Secondary system condenser and turbine: in an advanced stage of installation.

8. Substations: Principal (400 KV) in final installation phase. Its completion is expected during this quarter. Support substation: completed and voltage on.

9. Condenser cooling circuit or tertiary circuit: Civil engineering work (cooling towers) has been completed, and the rest of the components (pumps, etc.) are in an advanced phase of installation.

10. Demineralization plant: Now in production. Motor control booths: ready, but still awaiting final testing.

11. Control room: in advanced installation stage. Computers: The basic computer is almost operational now (scheduled to be ready by 7 October).

12. Primary circuit's emergency cooling system (two pools and two sets of concrete towers using a forced draft system): Completed, and pools have been tested.

Hydraulic testing of primary circuit: This is expected to be done during the first 4 months of 1986.

Fuel loading: scheduled for the end of next year [1986].

Vandellos II

The Vandellos II nuclear power plant is located on the Mediterranean coast approximately 40 kilometers south of Tarragona between highway A-7 and the sea, in the Lleria Gulch in the Malaset area. The closest town is the city of Hospitalet del Infante, about 6.5 kilometers northeast of the plant's site.

This plant will complete the nuclear electricity production system of the Catalan Autonomous Department, which in its initial phase handled the Vandellos I and Asco I nuclear power plants (first and second generation plants, respectively). When they began operation, they were able to provide coverage for a large electricity demand throughout the entire region.

Chronologically, this plant is one of the third generation group, that is, one of the last in the major nuclear program undertaken in the 1960s and beginning of the 1970s. Consequently, it incorporates the latest and most advanced technology.

The up-to-date features of its design have been recognized internationally. With its new and carefully designed special features, it has served as a reference plant for a number of bids conducted abroad.

The facility will be equipped with a light pressurized water nuclear boiler with a nominal power of 2,785 MW of thermal energy, powering a turbo-alternator with a gross power of 982 MWe. It will have three cooling circuits, slightly enriched uranium dioxide fuel, plus the requisite auxiliary systems and technological safeguards.

The plant's annual estimated production of electricity will be about 5.5 billion kW/h. One month a year is scheduled for shutdown for refuelling.

Its construction permit was issued by the ministry of industry and energy on 29 December 1980. Its public utility statement was issued on 9 May 1981, and it has received the appropriate licenses from the Vandellos municipal council.

Over 4,000 people have worked on the plant's construction. They were needed to move approximately 1,300,000 m^3 of rocks and earth, to pour about 190,000 m^3 of concrete reinforced with approximately 27,000 tons of steel for framework structures, and to install roughly 70 kilometers of pipes and 2,200 kilometers of electrical wiring.

Over 80 percent of the work for the plant's construction is being done by Spanish industries.

Current Status of the Project

	Percentage Completed
Pipes	97
Mechanical equipment	94
Electrical equipment	77
Total equipment	90

Construction

By the end of August 1985, it was calculated that 75 percent of the construction had been completed.

Civil Engineering

At the start of the project, 320,000 m^3 of concrete were poured for buildings and external areas. Of this, 192,000 m^3 was structural concrete and the rest was low-grade concrete used for fill.

Various Stages of Completion

EAH [Framing, Reinforcement, and Concrete Work]

The stage of completion of this work, by building, is as follows:

	Percentage of completion
Containment building	99
Auxiliary building	100
Access building to the auxiliary building	100
Control building	100
Penetrations building	100
Cat-Diesel building	100
Components building	100
Fuel building	100
Turbine building	100
Equipment preparation building	100
Circulation water	85
External areas	90
Wastes building	92

The overall status of the EAH is 95 percent complete.

Surface coverings for all the buildings.
Lining for the containment building: 100 percent complete.
Fuel storage pool: 100 percent.
Refuelling cavity and transfer channel: 100 percent complete.

Status of all civil engineering work:

The total status of the civil engineering work is 90 percent complete; this includes the EAH, surface coverings, metal structures, and architecture.

The concrete dome of the reactor building has been finished; it now needs only its prestressed concrete work, which is in the process of completion at the present time.

Mechanical assemblies for the nuclear part of the plant:

	Percentage of completion
Large pipework	72
Small pipes	55
NSSS [Nuclear Steam Safety System]	65
Rest of equipment	91

Origin status is 69 percent complete.

Mechanical assemblies for the conventional part of the plant:

	Percentage of completion
Condenser	96
Large pipework	67
Small pipes	48
Generator pipes	47
Rest of equipment	76

Total origin status is 65 percent complete.

Electrical systems:	Percentage of completion
Trays	94
Ducts	44
Installation of wiring	23
Connections	1
Electrical equipment	56
Lighting and miscellaneous	23
Grounding system	20
Safety plan	0

Origin status is 44 percent complete.

Conditioning and other systems:

Ducts	54
Equipment	74
Fire protection systems	1

Origin status is 49 percent complete.

Instrument installation;

Preparation for this installation was made in March, to be started in April; 1 percent had been completed by September.

Total status of installation work;

	Percentage of completion
Mechanical installations for the nuclear part of the plant	69
Mechanical installations for the conventional part of the plant	65
Electrical installations	44
Air conditioning installation	49
Instruments installation	1

Total origin status is 55 percent complete.

For the region, the construction of this nuclear power plant has provided the requisite continuity in investments and a high level of development for the people of the Tarragona area. The economic benefits for the inhabitants of the entire region created by the ongoing investments in a variety of projects, and in general, all of this construction activity, have culminated with the construction of the plant. This has provided a source of work for local equipment manufacturers; it has drawn resources to the area, and has provided a source of economic wellbeing for the region's people.

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CSO: 5100/2512

END

JPRS-TND-86-008

10 APRIL 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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10 April 1986

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NUCLEAR DEVELOPMENT AND PROLIFERATION

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PROGRESS REPORT ON CONSTRUCTION OF NUCLEAR POWER UNITS

Socialist Cooperation at Kozloduy

Sofia TRUD in Bulgarian 22 Jan 86 pp 1-2

[Article by Vasil Pavlov and Valeri Vedov, TRUD correspondents]

[Text] Let us go back in time for about 2 years. A contract for international socialist competition and cooperation and mutual aid was concluded on 19 April 1984, on the initiative of the Central Council of Bulgarian Trade Unions and with the cooperation of the trade unions of the socialist countries, among the construction workers of block number 5 of the First Nuclear Power Plant in Kozloduy and 22 collectives procuring equipment from the Soviet Union, the GDR, Poland, Hungary and Czechoslovakia. What made the conclusion of this contract necessary?

Above all, it was the need for the accelerated building and commissioning of the first 1000-megawatt turbine outside the Soviet Union. Then, the very scale of construction and the unique nature of the block as a power generating object demanded the frequent ordering and urgent delivery of equipment, alongside designing and the building and installation of equipment, while at the same time seeking and mastering the use of new construction and installation technologies. Thirdly, the 1000-megawatt energy block includes the latest achievements of scientific and technical progress in the power generating industry. It is saturated with computers and a substantial number of microprocessors. The entire control-measuring equipment and all control and safety systems are based on electronics. As a whole, the installation of this block uses a new higher level of technology. This called for the unification and coordination of the efforts of construction workers and equipment manufacturing collectives. Furthermore, it was precisely the contract which allows us even now, after the construction project has been completed in its general outlines, to carry out start-up tuning operations with total understanding and without hindrances.

Such international socialist competition is a new and previously unknown form of social influence and of unifying the efforts of labor collectives of fraternal socialist countries. It was extensively developed on the basis of specific contracts and has already practically proven its advantages in carrying out assignments based on the 1984 Moscow summit economic conference.

The competition has harnessed a number of labor collectives, such as those of the Chepel Plant in Hungary, the Belgorod Power Machine Plant in the USSR and others--for the ahead-of-schedule manufacturing and procurement of additional equipment.

Two years later the results are clear. They were reported and the new contract for the fast building of a sixth power unit was signed yesterday at the Kozloduy SAEK [Economic Nuclear Power Combine] in the presence of representatives of the construction collectives from our country and the collectives producing the equipment in the USSR, the GDR, Poland, Hungary and Czechoslovakia. Also present were delegations of the trade unions of the fraternal countries and members of the embassies of the countries participating in the competition. The meeting was chaired by Ivan Angelov, Bulgarian Trade Unions Central Council secretary. Engineer Boris Georgiev, director of the Investor's Control Directorate, submitted a report on the construction of the fifth power block. He described the effective role of the competition, its mobilizing force and the help it provided in shortening the time of the building of the 1000-megawatt turbine and the successful implementation of the party's assignment of its completion ahead of schedule. He pointed out that during the 2 years contacts among construction workers and their partners in the fraternal countries not only were not interrupted but also led to the adoption of new faster schedules for supplying a large share of the equipment. On behalf of the collective, he expressed the hope that with signing the new contract for the sixth power block, fraternal cooperation will become increasingly more useful.

The winners of the competition for the past 2 years were announced. The winners were the Izhorsk Plant, the Kharkov Turbines Plant and the Podolsk Ordzhonikidze Plant in the Soviet Union, the Polish Zgoda Plant and the "Four April" Plant in Hungary. Ivan Angelov presented the representatives of the winning collectives the special banners of the Bulgarian Trade Unions Central Council, certificates and plaques. The SKET Plant in the GDR was second. It was awarded a special flag, a certificate and a plaque; third was the Tesla Plant in Czechoslovakia. "Champion in the Socialist Competition" badges and gifts in building the fifth energy block were presented to workers and specialists who had made the greatest individual contribution to the implementation of the assignments at the Kozloduy SAEK.

A new competition contract for building the sixth power block was signed by Engineer Boris Georgiev, on the Bulgarian side, and by the heads of the delegations of the trade unions of enterprises supplying the equipment: Aleksandr Koshkin, secretary of the Heavy Machine Building Workers Trade Union Central Committee in the USSR, Gudrun Toeier, on behalf of the United German Free Trade Unions, Stephan Kozhyachi, deputy chairman of the All-Poland Trade Union Accord, Geyza Barakyai, responsible secretary of the Trade Union of Metallurgical Workers in Hungary, and Frantisek Badin, secretary of the Central Committee of Machine Building Workers Trade Union in Czechoslovakia.

After the contract was signed we turned to some of the winners in the competition for the first stage. Here are their statements:

Valentin B. Galavin, boiler maker at the Ordzhonikidze Plant: "We delivered on time and on a high quality level the steam generators, separators and pipes for the first circuit of the reactor for the fifth block. Although I already knew the rating I am once again excited. I shall describe to my comrades everything that I saw and that was said. On behalf of the leadership and the collective, I am empowered to state that we shall struggle once again for first place during the next stage in the competition as well."

Rishard Antonyuk, chairman of the Zgoda Plant trade union committee in Poland: "Our collective supplied the stationary diesel engines for the fifth block. All of us were very happy to be told that we were the winners. Now, back home, we shall describe at a general meeting our encounters with the fraternal collectives and let the people themselves determine the individual bearers of the awards. We are ready to deliver the engines for the sixth block immediately and with excellent quality."

Vaszlo Baran, chairman of the trade union committees of the "Four April" Plant in Hungary: "We were not told in advance that we had won the competition, for which reason the surprise was great and pleasing. The new procurement of the sixth block is not bigger than the previous one, so that in my view our collective will be able to complete it in time and to strive once again for first place."

New Power Turbine

Sofia OTECHESTVEN FRONT in Bulgarian 29 Jan 86 p 1

[Article by Sergey Tsepulin]

[Text] "The hull of the nuclear reactor for the sixth power block, generating 1000 megawatts, arrived from the Soviet Union at the nuclear power plant in Kozloduy."

This information, which came out of the BTA teletype on 10 January, significantly changed the interest shown in the nuclear power plant. So far, it was as though everything was related to the first 1000-megawatt turbine--the fifth power block. Perhaps the reason was that the concrete foundations of the sixth block had still not "emerged" on the surface. Now, however, it is clear that the new construction epic of the first nuclear power plant will be the second 1000-megawatt reactor.

The announcement also reported the record speed at which the 340-ton giant was unloaded and named the people who coped with this task. They included Soviet specialist Valentin Podgurskiy, in charge of the receiving, storing and accounting for the equipment.

A short report cannot include a great deal of information. Frequently one can not even understand the significance of what was accomplished and of the work done by those responsible for the project.

Currently preparations are being made for the wrapping and protection of the hull at the port for the winter. Although it may seem difficult to describe the machines of the nuclear as brittle (some of them weigh in excess of 100 tons), they are handled as though they were Chinese porcelain vases. Acquaintance with the construction of the sixth power block begins at the warehouse. The separators-steam reheaters, the tanks for the emergency cooling systems of the area, the heat exchange equipment, and others have already arrived from the Soviet Union. This is only part of the large assemblies for the sixth power block. The purpose of the visit to the warehouse by V. Podgurskiy and his Bulgarian colleague Ventsislav Medovinski, deputy director of the Investor's Control Directorate, was in order to check the way the already arrived equipment was stored. On the way to the warehouse the car was stopped by a crane which was loading parts for block number five. With every passing day, the tension at the warehouse is mounting steadily. The number of machine units for the first 1000-megawatt turbine is diminishing with every passing day while with increasing frequency we see equipment marked "Sixth Block."

The block itself is already rising several meters above the ground. We can already see the outlines of the transportation hall and the columns of the machine hall. The powerful Demag crane, which lifted the dome of block number five, is already waiting its turn for the construction of the new reactor.

This will be a serious test for the power workers and builders. The turbine of the fifth power block must be started up before the 13th BCP Congress. This will be accomplished by releasing the steam from block number four. The signaling bulb will flash and electricity will be supplied. The measuring instruments will indicate the pressure and temperature in the turbine units. The people are confident that the tests will be successful.

The sixth power block will the same and built like the fifth. It will have the same power and same design. However, its completion deadlines are shorter. The Bulgarian workers have already gained experience. Thus, for example, an assembly line has been set up for the building of the walls which will be around the sealed area surrounding the reactor. All operations are being done on the site. After that the finished panel will be lifted and positioned. The work will be done faster and with lesser problems.

Even now the line is not idle. One-half of the 12 walls for block number six have already been brought here. For the time being, they are no more than sheets of iron. The assembling is not advancing all that rapidly but the welders in the brigade of Hero of Socialist Labor Ivan Radev are already at work. In few a months the panels will be closed like the petals of a flower at night and will conceal the heart of the block--the nuclear reactor.

Although some time remains before the fifth block will be started up, already now a group of Soviet specialists are concerned with problems of finding operational cadres. Vassiliy Sharayevskiy, secretary of the party organization of the group of specialists in control-measuring instruments and automation, said:

"We would like to leave behind well-trained cadres. This can be achieved two ways: we have organized a cycle of lectures for theoretical knowledge of brigade leaders and technical managers; we work with the practical workers together with tools in hand at the construction site. Currently a number of Soviet people are working in the international brigades in assembling block number five. A technical school for nuclear power industry operates in Kozloduy. We are helping the students and perhaps we shall contribute for the future power workers to develop even greater love for their profession."

New Technology at Belene

Sofia ZEMEDELSKO ZNAME in Bulgarian 8 Feb 86 p 1

[Article by Z. Lalova]

[Text] The use of a new technology was undertaken in making the "gravel cushion" at the foundations of the first power block of the future nuclear power plant in Belene. Based on the system developed by Vasil Adamov, chief designer and head of shift at the project, a team of specialists experimented and applied an entirely new and efficient method for the study and reinforcement of the level. Previously, this required four drills per meter, with anchors and subsequent concrete pouring. This meant that 2 days per drill and 1 day for anchoring were needed. The waiting period for the concrete to harden was 7 days, after which the work could continue. Under the new method, prefabricated construction panels are used. In a single day they are used to make frames in which the concrete is poured. The work is conducted on an assembly line basis, meter after meter, without obstructing the hardening of the concrete. Through this method 44 meters have already been covered. The development has been submitted for approval as a rationalization. Savings will total 60,000 leva. The indirect effect is much greater, for this method allows a rapid study of the nature of the bearing horizontal plate, i.e., of the soil on which the foundations are being poured.

5003
CSO: 5100/3022

NEW SYSTEM FOR STORING RADIOACTIVE WASTE

Budapest HETI VILAGGAZDASAG in Hungarian No 2, 11 Jan 86 pp 52-54

[Interview with Zoltan Nagy and Antal Dobrosy by Florian Mezes: "Lattice Billions. Storage of Radioactive Waste at Paks"; date and place not specified.]

[Text] With a single idea, a 3-billion forint savings was made in the state budget by two workers of the Powerplant Investment Enterprise: Zoltan Nagy (age 61), the chief of the primary mechanical engineering group, and Antal Dobrosy (age 47), the director of the nuclear department of the chief engineering group. The savings were made by not having to build a new storage facility for the used, radioactive fuel elements which come from the nuclear power plant at Paks, because due to an innovative structural solution, space could be better utilized in the current facility. We talked with the two investment experts about the development of the idea and the problems associated with building the so-called high density lattice.

[HVG] Although the total investment at the Paks nuclear power station has reached 75 billion forints, a savings of 3 billion is sufficiently large that one's attention is immediately drawn to it. What was needed for this savings to come about?

[Nagy] When the investments were started at Paks, word was out that the Soviet Union would accept the burned-out, used fuel elements after 3 years' storage in Hungary. In 1979, however, it was announced that as from other Socialist states, the elements will be accepted only after 10 years' storage. As a consequence, we would have had to build another, intermediate storage facility for the four reactor blocks in which the about 5000 burned-out elements generated during the 10 years would have been stored. The Soviet partner had given us the plans for the intermediate storage facility, according to which the cost of construction would have reached 3 billion forints. We have saved this much money by doubling the capacity of the present "resting" storage facilities with the help of the high density lattice, in which we now can store not 3 but 6 years' worth of burned-out heating elements coming from the nuclear reactor. In reality we saved more than 3 billions because if we look at the value to the economy in 1991 of a current 3 billion forints, the savings would reach 5 billions. In the meanwhile the technical possibility has presented itself of putting the burned-out elements into a dry storage facility after just 5 years' wet storage. The cost of this construction is one-half that of the type considered earlier. Even if the Soviet Union would have adhered to the 10-year term for accepting the elements, we would have saved 1.5 billion forints. But in February of last year, the Soviet partner has agreed to accept the elemnts after 5 years' storage--probably because it will also initiate dry storage--so we didn't have to build the dry storage facility either.

[HVG] Both of you signed the 1983 study in which you stated that instead of the new storge facility the old one should be modified with a honeycomb-like high density lattice. Whose idea was this method?

[Nagy] The idea rests on data from the literature, on our experiences in building nuclear power stations, and on earlier Hungarian research. This structure has been used in the West for a long time so that we had access to information gathered from experience. In the Socialist countries,the high density lattice occurs only as a word in encyclopedias, and Hungary is the first place where it has become reality.

[HVG] Which of you had the idea that this could be done?

[Nagy] I called over my colleague and told him thatI was old enough tostart something that might not work out. My experience has shown that it is very difficult to carry out an innovative solution to a problem because of the stiff resistance one usually encounters. My colleague said that the suggested solution is necessary and well-founded, and that it should be put into effect. If we do it together, we will be able to do it.

[HVG] If in the West this is a proven method, were there any risks?

[Dobrosy] If we had not finished on time, then every day's delay would have caused a loss of 10 million forints to the economy. If we had not been able to remove the used heating elements, because we had no place to put them, we would have had to shut down the whole power station.

[Nagy] What's more, this extra expense of 10 million forints is true only if we calculate with a kilowatthour cost of 1.5 forints. In reality, one has to take into account that every kilowatthour of energy produces 60-70 forints worth of products, depending on how it is used.

[HVG] Were only the two of you involved with the realization of this idea at the Enterprise?

[Nagy] We involved the whole primary mechanical engineering group so that it is more correct to say that it was the group that declared in writing in October 1983 that this would be the better solution, and in one year proved that the written projections were correct. The first construction contracts were signed last May.

[HVG] What was the total cost of producing and building the high density lattice?

[Nagy] For the four blocks, 354 million forints, including everything.

[HVG] The new storage system was ready 3 weeks before the planned deadline. What sort of feeling was it to know that you had saved such a large sum so inexpensively?

[Nagy] We look at things from a technical point of view. Of course, we know that 3 billions are 3 thousand millions, a very large number, and we are happy that we could save this much. We are also proud that we were the first to execute this project in a Socialist country. But what we esteem the most is the technical and organizational activity which was necessary for solving the problem. Great technological results can only be achieved if we are in the clear about the general direction of technological change and there is willingness on the part not only of the technical people but also the workers of the financing and management organizations. I believe that we are here precisely so that we can save sums of this size by coming up with better technical solutions.

[Dobrosy] These days in Hungary, we talk a lot about the changes in the structure of production, but a lot less about what the requirements for these are. Ours was the rare situation when we, the users, convinced the enterprises involved in the production of the high density lattice that they need to transform the structure of their production. After all, the lattice is made of a special kind of boron steel with an accuracy of a fraction of a millimeter. At one of the manufacturers, in the factory of the VEGYEPSZER at Tiszakecske, even the industrial application of plasma welding had to be introduced to the workers, a first in Hungary. The introduction of new techniques and technologies will of course profit the manufacturers as well, but it cannot be said that such structural change was of vital interest to them, so they had to be convinced to proceed this way. Only by convincing the State Development Bank, the Power Station and Power-Distribution Office, the Central Physics Research Institute and other concerned organs were we able to achieve our goal.

[HVG] How could you urge the various enterprises to cooperate? Technical devlopment alone does not seem much of a motivating force in Hungary.

[Nagy] We've been working in the field for a long time and our circle of acquaintances is fairly large so we were successful in convincing our partners to start this project. Money was certainly no motivating force for the workers in the factories or here in the main engineering group because nothing was promised ahead of time. It is true that we were at the manufacturing sites on Saturdays and Sundays too, involving almost every one of our colleagues here, and also the designers, especially in the last few weeks. As it turns out, the manufacturers and our workers have received compensation, due to the preferential treatment accorded the power station at Paks. We could get some money for paying premiums as well.

[HVG] From what we have discussed, it seems that you did not face much resistance within your own company. After all, it was your duty to find a new, better solution.

[Nagy] Our duty was to build the intermediate storage facility.

[HVG] Did your work run counter to your duty?

[Dobrosy] It is a moral responsibility to be the champion of technical innovation. One should not follow assigned tasks blindly.

[HVG] How much compensation did you receive?

[Nagy] Let me not name a sum but just say that we received enough to be satisfied. Not as much of course as we would have, had we presented the idea as an innovation. Then we could have received millions.

[HVG] Could it have been accepted as an innovation? After all, as you have said, this solution has been used in other countries for a long time.

[Nagy] Yes, probably we could have prevailed. We thought though that it would not be right to accept money meant for innovations. Especially, since already at the discussions concerned with the investments for the power station the question had come up of equiping the "resting pools" with high density lattices. At the time this could not be done because of a lack of engineers, construction materials, special boron steel--this cannot be found in Hungary or in any other Socialist state--manufacturers and money. But there were no coercing conditions as there are now because we were counting with a return of the fuel elements in 3 years.

[HVG] What benefit does your enterprise derive from having developed such a modern manufacturing capacity?

[Nagy] The Kraftwerk Union firm, which delivered the equipment and materials, had at the time offered for sale the manufacturing license. Unfortunately, we could not choose this solution--the procedure for licensing in Hungary is so time-consuming and we were tied to deadlines--because waiting would have presented unsolvable difficulties. Since that time we have obtained permission for the export of the so-called absorbing casings, and we have made a cooperative agreement with the Kraftwerk Union for the joint manufacture and marketing of casings for which this company would provide the necessary materials. If such export activity would become reality, then as exporters we would earn a share. For the time being, however, nothing is certain because the casings used in the storage facilities of Western nuclear power stations are square-shaped, conforming to the shape of the elements used there, while in the nuclear power stations of te Socialist countries, and thus in Hungary, hexagonal units are used. The production facilities would have to be retooled, necessitating further imports. No decision regarding this has been made yet.

Picture Headings

1. Zoltan Nagy and Antal Dobrosy.
2. The installation of the absorbing casings at Paks. One counted on transporting the burned-out fuel elements to the Soviet Union every 3 years.

12846
CSO: 5100/3018

OPPOSITION TO NUCLEAR POWER PROGRAM REPORTED

'Strong Nuclear Lobby'

AU062058 Belgrade NIN in Serbo-Croatian No. 1835 2 Mar 86 pp 18-21

[Dragan Jovanovic article: "Nuclear Power Stations in Public"]

[Excerpts] The Yugoslav nuclear story may begin back in 1948, when our nuclear institutes were formed, or 1958, when the incident occurred in Vinca. We would not err, either, if we began the story in 1974, when the construction of the Krsko nuclear power station of 632 MW began. But the story may also begin 4 or 5 years ago, when a plan was drafted for the construction of four power stations, although the construction of as many as 20 nuclear power stations had been thought about earlier. Somewhere there, this Yugoslav story suddenly becomes a proper nuclear thriller, in which Yugoslavia has a "rope tied around its neck," which was so dramatically pointed out by Dr Dragisa Ivanovic at the LCY Central Committee session last week.

Dejan Dimov, higher counselor in the Yugoslav Chamber of Economy, stated for NIN last year that there exists in Yugoslavia a strong nuclear lobby which has found a specific form in our country and works much more efficiently than in the West. "Our political system," Dimov added, "is being misused in the present situation, so that individual anonymous, but very powerful groups, political and scientific in nature, not only manipulate, but also exert full control over, information which as a rule, I don't know why, is strictly confidential, so that one cannot discuss it.

In this way this lobby not only succeeds in directing investment in energy but also in deluding the highest organs in this country. The world's big traders appear to be best prepared to find 'janissaries' in our ranks," Dimov said on that occasion.

To what extent these warnings have been correct may be seen from the sequence of events: until immediately before the bids for the construction of four nuclear power stations have been invited, all the important information about the Yugoslav nuclear program was under the "strictly confidential" classification, and was thus journalistically unusuable even if journalists could get hold of it. . . .

About Charms and Advantages

One of the rare (if not the only) public and organized appearance by most select nuclear advocates took place by the end of last year in Belgrade, at a discussion of the Federation of Engineers and Technicians of Yugoslavia.

At about the same time, at the end of last year, NIN organized a roundtable conference on energy.

Excitement and involvement of the public was caused by a television debate conducted on the "Cinema-Eye" program at the beginning of this year. In the meantime, matters have been "heating up." In Belgrade one hears accusations that the opponents of the nuclear power stations and journalists who ask questions are "a branch of the Greens financed by the CIA."

A similar accusation comes from Zagreb. In an interview in VJESNIK, Vjekoslav Srb, president of the Committee for Energy, Industry, Mining, and Crafts of the SR of Croatia, in defending nuclear energy says the following: "It seems that other behind-the-scenes games stand behind the stories about the nuclear power stations and the recent flood of reports on their alleged unreliability. It is, after all, known that the greatest opponents of nuclear power stations are multinational oil companies."

Nuclear Program Defended

LD112146 Belgrade TANJUG Domestic Service in Serbo-Croatian 1635 GMT 11 Mar 86

[Excerpts] Belgrade, 11 Mar (TANJUG) — At its session today the Committee for Internal Policy of the SFRY Assembly, Federal Chamber endorsed the draft document on the strategy of the SFRY's technological development. Delegates to the committee supported the orientation toward a united and organized search for solutions to the issue of the country's technological development. The need was emphasized for professional and efficient work to outline and implement the strategy.

In reply to a delegate's question, Rade Pavlovic, president of the Federal Committee for Energy and Industry, stressed that the nuclear plants construction program is a result of careful and professional work and is based on an analysis of Yugoslavia's realistic possibilities and development needs.

An "antinuclear" atmosphere has been created in the country because some individuals are juggling with inaccurate facts while others have succumbed to various prejudices, Pavlovic said.

According to an analysis conducted by the Federal Committee for Energy and Technology, Yugoslavia cannot secure enough electricity on a long-term basis for other energy sources. The alleged dangers of nuclear power plants are exaggerated: There have so far been no casualties caused by the use of nuclear energy (the casualties however did occur in research institutes during the research period).

The committee decided that this issue should be discussed in a calm, professional, and democratic way, without making either negative or positive preliminary assessments which could prejudice the whole debate. Delegates alos discussed a document prepared by the Federal Executive Council which deals with the situation in fire prevention. Delegates agreed that the situation in this sphere is very bad and at the same time endorsed the government's numerous measures designed to improve it.

Nuclear Waste Dump Rejected

AU111954 Belgrade Domestic Service in Serbo-Croatian 1400 GMT 11 Mar 86

[Text] The citizens of Slavonija do not want a dump for radioactive waste from nuclear power plants to be built on their territory, something which is mentioned as a possibility in the draft long-term zoning plan for Croatia. In this respect remarks voiced in several communes of western Slavonija have also been accepted at the session of the Executive Council of the Community of the Osijek Communes in its discussion of the guidelines for zoning policy in the Slavinija-Baranja region up to 1990.

It was reiterated that Slavonija is the greatest wheat producing area in Croatia, and that it is very rich in water. It is in the very hills that have natural, drinking-water springs that the location of the nuclear waste dump is planned.

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CSO: 5100/3026

CNEA CHAIRMAN ON FUTURE OF NUCLEAR PROGRAM

PY101247 Buenos Aires BUENOS AIRES HERALD in English 9 Mar 86 p 9

[Article by Roger Atwood]

[Text] With its two reactors, Atucha I and Embalse, Argentina now has 11.4 percent of its electric energy needs supplied by nuclear power, the fourteenth highest percentage in the world. Since the 1950s, Argentina has been the undisputed nuclear leader in Latin America, with a range of nuclear first to its name.

Still, severe budget cuts have taken their toll. The Atucha II plant is four years behind schedule, and the Arroyito heavy water plant will not be finished until 1988 at the earliest. Production at the Pilcaniyeu enriched uranium plant is at a fraction of capacity, and work at the Tandar heavy ion accelerator plant has come to a near standstill.

Argentina's nuclear potential also extends to weaponry. In December 1983, director-general Hans Blix of the International Atomic Energy Agency, said after touring Argentina's nuclear facilities that all that stands between Argentina and the bomb is "a decision of state."

World apprehension remains high, despite the government's insistence that it is not interested in making the bomb.

National Atomic Energy Commission (CNEA) director Alberto Constantini, a retired nuclear engineer himself, spoke with the HERALD recently.

[Atwood] In light of budget cuts, what is the future of Argentina's nuclear programme?

[Constantini] In 1986, as in earlier years, our (original) budget was not sufficient to carry through on the largest projects that we're constructing, Atucha II and the Arroyito heavy water plant. But by decision of President Alfonsin, we have resolved to finish Atucha II by 1992 and the heavy water plant by 1988. I would say that the 1986 budget for these plants is sufficient to keep them moving along at the rate they should have had in earlier years. At Atucha II, you can now see work moving at a faster pace. Cranes are more active and there are more workers--in short, a project in progress. And I found businessmen there enthusiastic, saying that this is a new stage.

[Atwood] Is there still a danger that top-level technicians will leave the country if there are new budget cuts?

[Constantini] My problem is not budget cuts. Although it's true that we have not been able to give better salaries because of government policies, I have attended to technicians' needs by maintaining active laboratories with all elements they need, libraries, and trips abroad. But we must not underestimate that real salaries can come up at any time. Up to now, engineers have not left, but we have to treat the scientist with realism. We can't exaggerate his love for science.

[Atwood] Has the Radical government vacillated on the nuclear plan?

[Constantini] That is a mirage. In President Alfonsin I have noted concern for economic problems, but never vacillation on the philosophy of the nuclear plan. The nuclear programme had a golden age, an age of euphoria that lasted until about 1980. In those days, there was lots of money, but we lost count of much of it and now we have to pay. When I received CNEA (in 1983), Atucha was six years behind schedule because of delays left over from the military years. Last year I proposed to President Alfonsin that if we're not going to finish Atucha, that we should say so to the country, and he said "No, no. This project is going to get finished." And I told him to tell that to (Economy Minister Juan) Sourrouville and (Treasury Secreatry Mario) Brodersohn, who hold the keys to the treasury. And so at a meeting at Olivos, Alfonsin acted as my defence attorney. The support of the President was crystal clear. But I have never found in anyone a pre-disposition against the nuclear programme, except for a few ecologists who are ideologues.

[Atwood] How are prospects for exporting nuclear technology?

[Constantini] Relatively good. In Peru and Algeria, we are constructing reactors. Our country is well looked-upon abroad in the nuclear field, and our technology and technicians are not underestimated in the world. That is very important and we must not lose it.

[Atwood] Does CNEA have any plans to develop nuclear weapons?

[Constantini] Absolutely not. The technology needed to build a bomb is known by any country well enough advanced in the field. In no way whatsoever is Argentina thinking of any war-like use of nuclear energy, no bombs or missiles, nothing, for philosophical reasons and reasons that have to do with international politics. I don't aspire to compete in the bomb with the more advanced countries. I think that the bomb for us, apart from being outside the country's philosophy and traditions, is a stupid and negative luxury for the world. With the risk, danger, and threat that nuclear weapons pose, we would never do it.

[Atwood] Aren't there some circumstances under which Argentina might use its technology to build a bomb?

[Constantini] No, none. We will not fight against humanity. We are in favour of humanity.

[Atwood] Is Argentina prepared to sell information to other countries which could be used to build a bomb?

[Constantini] In no way. We know the technology because the CNEA technicians are at a very high level. But never was that technology put on the market, much less exported.

[Atwood] But doesn't Argentina derive security benefits by the mere possession of the technology to build the bomb?

[HERALD] We have the technology that any nuclear scientist has (to build the bomb). It is not that complex. What you need are certain materials, which Argentina has access to in certain moments. But Argentina has not started the conceptual or basic development. If I took five nuclear technicians and said, "In six months, I want the basic engineering," I have no doubt they would come up with it. The only thing you would have to do is give an order and put the team to work. But these brains we have in CNEA might even resist carrying out such orders, even if they were given, because they're not bent on working in that area either. There may be many people in CNEA who could work in that area (nuclear weaponry), but they have never done it. It's a road that exists but that Argentina never wanted to take, not with good or bad governments, democracies or dictatorships.

[Atwood] Why won't Argentina sign the Treaty of Tlatelolco (establishing Latin America as a nuclear weapons free zone)?

[Constantini] That is another problem. Argentina did not ratify it because we considered it discriminatory and because it affects our sovereignty. The treaty did not disarm those who were armed; it kept the strong strong and the weak weak. If Tlatelolco did not achieve disarmament among the most advanced countries but did keep the disarmed countries disarmed, I wonder what the purpose of it is. It is openly discriminatory, and for 15 years Argentina has said it will not sign. It is an old philosophic decision that has nothing to do with our nuclear policy.

[Atwood] What has become of Argentina's competition in the nuclear field with Brazil?

[Constantini] I would say there is no competition. Brazil is indebted, it too made political mistakes, but it has managed to construct an infrastructure that allowed it to pull itself out of depression more easily than we. We ran up a debt by spending the money mainly in speculation, Brazil spent in on infrastructure. I see Brazil as a country that has been more of an example than some model that we have to feel bothered by.

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CSO: 5100/2053

YRIART REPORTS CNEA FUNDS SUBSTANTIALLY INCREASED

Buenos Aires AMBITO FINANCIERO in Spanish 2 Jan 86 p 20

[Article by Martin F. Yriart]

[Text] Last November, the National Atomic Energy Commission [CNEA] billed the Unifed Billing Office [DUC] $14 million for electrical energy it had supplied.

During that month the two nuclear power plants, Atucha I and Embalse, operated at full capacity, and they are continuing at the same level today, saving greater Buenor Aires from new summer brownouts.

The fact should not be surprising, because nuclear power facilities are designed to operate as primary stations, owing to their high rate of availability and to the need to optimize their capital expenses and the cost of fuel (which is consumed even when the plant is not generating electricity).

However, within the current policy governing electrical generation formulated under energy transmission of super-secretary, Conrado Storani, the roles have been switched. In fact, in the strategy formulated by the radical government for electrical energy production, hydroelectric plants received top priority, so that the DUC for the last two years has kept the two nuclear power plants operating at less than 50 percent of their total capacity, at the time in the investment timetable when it was being decided to postpone finalizing Atucha II.

This decision was made possible owing to the fact that total energy demand has not grown at the anticipated rate, while new plants were being brought on line which considerably increased the technical reserve of the system. At the same time, in the Uruguay and Limay river basins extraordinary levels of hydroelectric output were being produced. But now, because of an unforeseen circumstance--but not therefore less predictable--a whim of the weather, the Chocon and Salto Grande [power plants] have been practically without water, and their power, normally reserved for peak consumption times, is being driven by an eyedropper.

The episode should be sufficient warning to the formulators of official energy policy. Owing to the specific circumstances of Argentine energy structure, the nuclear source is the most reliable of all those available for electrical energy production throughout the public system because it is not subject ot the seasonal changes in water supply, nor to the complexities of production, transport, international prices, and the competing demands for conventional fuel oil and gas. A recent study done by the International Atomic Energy Organization indicates that the coefficient of availability (which measures the reliability of delivery) of nuclear power plants is improving year after year throughout the world. Production costs are decreasing proportionately.

Meanwhile, CNEA is receiving a healthy infusion of funds to strengthen a budget which in recent weeks has repeatedly caused headaches in the face of enormous construction contracts such as Atucha II and the heavy water plant at Arroyito which have been virtually paralyzed since 1983.

13106/12948
CSO: 5100/2038

PAPER DISCUSSES PROGRESS ON ATOMIC BOMB PROJECT

PY050150 Sao Paulo FOLHA DE SAO PAULO in Portuguese 2 Mar 86 p 2

[Editorial: "Continent Without the Bomb"]

[Text] The hypothesis that Brazil may soon be in the technological position to build an atomic bomb is reinforced by some recent reports that the country will have the capacity to build nuclear missiles by 1991.

The consensus today is that the manufacture of the Brazilian atomic bomb, as it is called, has become a political rather than a scientific question. Statements in that regard have been made by the Armed Forces chief of staff, Admiral Jose Maria do Amaral Oliveria, and his predecessor, Lieutenant Brigadier Waldyr Vasconcelos. The manufacture of the bomb has been constantly discussed at the National Security Council (CNS), according to reports by Brigadier Hugo de Oliveira Piva, director of the Aeronautics Technical Center (CTA). Reports that a parallel nuclear program is secretly being developed in the CTA are frequently heard.

Progress has been possible in the areas of technology and personnel specialization thanks to the strictly civilian nuclear program carried out in cooperation with the FRG and by the secret research program. This, sooner or later, will bring the knowhow needed to manufacture the nuclear components for building the bomb, such as enriched uranium and plutonium, the lack of which is currently a major obstacle to the construction of the Brazilian atomic bomb.

The hypothesis that Brazil has chosen to join the nuclear club presupposes the need to master basic technology for the production of a transportation vehicle for the atomic bomb; that is, a missile. In such an endeavor, Brazil could even do without the transfer of Chinese technology, because it has the rocket technology to place four Brazilian-made satellites in orbit in approximately 2 years. With minor modifications, the same rockets could carry a nuclear device, thus filing one of the last requirements for a Brazilian atomic missile.

It can be seen that the moment is fast approaching when, having mastered the necessary technical knowhow, Brazil will have to make the momentous decision. Brazil will then have to decide whether to maintain its peaceful image or join the atomic weapons club, with all the international consequences -- even that of becoming a potential target of the bomb -- especially in this continent. No doubt, if the latter choice is made, a nuclear race will be under way in this impoverished and indebted Latin America. A fundamental step to preventing the nuclear race in the continent would be given if Brazil publicly renounces the building of an atomic bomb once the technology has been mastered. Another step would be to seek an agreement on mutual inspection with all the other Latin American countries that are developing a nuclear program.

A true peace pact will thus be secured, as has already been proposed by President Raul Alfonsin. It is in the interest of the countries in this continent, especially of Brazil and Argentina, not to get sidetracked by strategic considerations that have no place in the scale of economic and social priorities. Such an agreement would at least be a concrete act of protest against the fatal logic of an arms race in the eyes of the world.

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CSO: 5100/2049

BRIEFS

ANGRA-I TO RESUME SERVICE--The Angra-I nuclear power plant, which has not been operating since January, will resume operations at the end of May. Marcio Costa, director of the nuclear section of the Furnas Electrical Power Plants, has reported that by then one-third of the burnt fuel will have been replaced, as well as the 48,000 steam condenser tubes that had suffered sea water corrosion problems. The remaining equipment will also have been checked and repaired. Costa hopes that these will be the last large-scale repairs to be made in the plant, which will then be technically and operationally capable to perform at full capacity with total security. The cost of the repairs and general check-up will be $50 million, $30 million of which will be paid for fuel. The Angra-I plant must start operating soon in order to reduce the load on the Santa Cruze thermoelectric plant, which, as of April, will have to operate at full capacity to meet the energy demands of the southeastern region. According to the director, the fuel cost at the thermoelectric plant is $160 million per year, while the fuel cost at the Angra-I plant is $30 million. [Text] [Rio de Janeiro O GLOBO in Portuguese 18 March 86 p 26] /9365

CSO: 5100/2054

INDIA

UN ENVOY ADDRESSES GENEVA DISARMAMENT CONFERENCE

New Delhi PATRIOT in English 28 Feb 86 p 7

[Text]

London, Feb 27 (PTI)—India has called for commencement of 'earnest negotiations' on various aspects of a treaty banning all tests of nuclear weapons which has found overwhelming international support.

Recalling that a great deal of international attention has recently been concentrated on the question of a comprehensive nuclear test ban, Indian ambassador to the UN at Geneva Alfred Gonsalves told the disarmament conference yesterday that the Soviet moratorium on such tests and the six-nation invitation to all nuclear weapon States to observe a moratorium for 12 months were noteworthy developments in this regard.

Mr Gonsalves said notwithstanding the disappointing negative votes of some of the nuclear weapons states, India was of the view that the conference on disarmament should harness the wide confluence of views among the vast majority of the nations and commence negotiations on a treaty banning for all times all tests of nuclear weapons.

Rejecting the arguments of those who were opposed to such a move, Mr Gonsalves told the conference that it was disconcerting to hear from a state possessing one of the largest nuclear arsenals that continuation of nuclear testing is a key element in its security and that a test ban can only be viewed as a long-term goal to be envisaged if at all following substantial reductions in nuclear arsenals.

He also dismissed as 'entirely groundless', the argument that nuclear tests are necessary to buttress the security policies of one military alliance or to maintain the credibility of so-called deterrence. "We do not see how carrying out more nuclear tests is essential, especially when the existing nuclear weapons with the super powers are, on each sides admission, adequate to deter the adversary", he added.

Referring to the question of monitoring any covert tests after such a treaty, the Indian ambassador said the efficacy of national and international seismic monitoring arrangements was by scientific standards adequate for effective verification. These scientific methods can, moreover, be very easily and speedily upgraded, he added. He recalled that the Soviet Union had acknowledged the need for an effective verification regime and agreed to on-site inspections too.

Mr Gonsalves emphasised that if the super powers are committed not to achieve military superiority over one another and if their existing weaponry ruled out the feasibility of winning or fighting nuclear war, continuation of nuclear testing cannot play any role in promoting the security of either of them. "The resultant need is to abandon nuclear weapon tests through an act of enlightened political will", he added.

India, he said, welcomed the latest proposals put forward by Soviet leader Mikhail Gorbachyov as they have further removed obstacles in the way of a Nuclear Test Ban Treaty. "We appreciate the Soviet decision to extend the moratorium on nuclear testing by three months", he added.

He expressed the hope that this gesture would be reciprocated by the United States and that the moratorium can be periodically extended while business-like negotiations on a comprehensive test ban proceed. "Nothing would be more befitting to the spirit of Geneva than the commencement of detailed negotiations on a comprehensive nuclear weapons test ban with the conference on disarmament", he added.

/9274
CSO: 5150/0081

IMPORTANCE OF INDIA DECLARING ITSELF NUCLEAR POWER

Bombay THE TIMES OF INDIA in English 28 Feb 86 p 1

[Article by K. Subrahmanyam]

[Text]

ADDRESSING the 27th party congress, the Soviet leader, Mr. Gorbachov, has proposed a conference of five nuclear powers to discuss disarmament and international security issues.

The five powers are the USSR, the US, China, Britain and France, the Yalta powers all of which are permanent members of the security council.

While Mr. Gorbachov's efforts to bring about elimination of nuclear weapons and measures contributing towards achievement of disarmament deserve to be fully supported, India cannot overlook the full implications of his proposal to convene the five-power conference.

It has very serious consequences for the international system, the non-aligned movement and India in particular. And it does not look as though these considerations have been given adequate attention in Moscow.

The present world order is the result of two international big power settlements. The first one was the Yalta conference among the U.S., the USSR and Britain, in which they devised the post-war system and the United Nations with today's five nuclear weapon powers wielding the veto.

India and the developing world had no say in the matter and even the veto for China was an act of charity on the part of the then U.S. president.

The second act in the laying down of the present international order was the imposition of the iniquitous nuclear non-proliferation treaty (NPT) in 1968 (not accidentally by the same three Yalta powers) which fitted the international system into the straitjacket of the nuclear weapons cult and made the nuclear weapons the prime international currency of power.

NAM STRUGGLE

India protested against this dangerous cult and stayed out of the nuclearised global order. Indeed, it led the non-aligned world in the struggle against the nuclear weapons cult and rejected the approach of arms control which, along with the NPT, constituted the legitimisation of nuclear weapons as the international currency of power.

The struggle of the non-aligned was for elimination of nuclear weapons, for delegitimising them and declaring their use and threat of use as a crime against humanity. India, along with Mexico, proposed a convention to outlaw nuclear weapons in the U.N. second special session on disarmament. This was supported by the non-aligned nations and the socialist bloc including the USSR and China. The only opposition has come from the NATO countries (except Greece).

Mr. Gorbachov's proposals of January 15, 1986, for the elimination of all nuclear weapons by the year 2000 A.D. signified the Soviet Union's radical departure from the hitherto accepted wisdom that nuclear weapons could not be disinvented and hence arms control was the only feasible approach while disarmament was not. It demonstrated that the USSR had been converted to the non-aligned approach advocating disarmament and elimination of nuclear weapons.

Once such a proposal was put forward by one superpower, the other is unable to reject it outright. Hence even President Reagan has agreed that the idea is basically good.

GHETTO STATUS

In these circumstances, a conference to consider nuclear disarmament and international security, confined to only five nuclear weapon powers, will amount to a major step in reordering the present international order. Is India going to allow itself to be left out of this end and watch from the sidelines the five nuclear weapon powers redesigning the international system without one sixth of humanity within the Indian nation state and the rest of the developing world having no say in it all?

Will it not mean freezing the Yalta mould for many decades to come and treating the developing and the non-aligned world as the ghetto of the international system?

This is the issue arising out of Mr. Gorbachov's proposal. It is quite likely that the strategies, the Euro-centrists and the nuclear weapon cultists among Mr. Gorbachov's advisers have not pointed out to him the implications of his proposal.

It is to be recalled that in the fifties, when Mr. Khruschev proposed a major power summit, he included India in the nations to be invited. That was one more reason for the Chinese to be incensed against him.

'PROCLAIM N-POWER'

If the entry fee for this club of powers, which will have an effective say in reordering the international system, is possession of nuclear weapons then India should, for this purpose, immediately consider proclaiming that it is to be counted now onwards as a nuclear weapon power.

There is a precedent for this course of action. Towards the end of second World War, after the Yalta conference when the U.N. structure was being finalised and it was clear that only the countries that fought the war against the axis powers would have an effective say in it, a number of Latin American countries, which till then had been neutral, declared war on Nazi Germany and joined the allies.

In the same way, let India declare itself a nuclear weapon power in order to have an effective say in the forthcoming summit. 'Future generations will not forgive us if we let this opportunity go by.

Mrs. Indira Gandhi and her set of pussillanimous advisers threw away the opportunity in 1967 though Dr. Bhabha worked hard to give India that option through his underground nuclear explosion project. Those who forget the lessons of history will be condemned to live it again.

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CSO: 5150/0080

INDIA

DEFENSE OFFICIAL CITES DANGER OF N-ARMS TO THIRD WORLD

Bombay THE TIMES OF INDIA in English 24 Feb 86 p 14

[Text] THERE is a much greater chance of the use of nuclear weapons on the territories of developing countries as the big powers chart out new strategies of intervention and coercive diplomacy.

This possibility has been brought out in a study "developing countries and nuclear issues," by Air Commodore Jasjit Singh, deputy director of the institute for defence studies and analysis (IDSA).

The stakes and interests of the developing countries in control of nuclear weapons assumes greater importance in view of these strategies by the developed countries and nuclear powers, according to the study.

Citing empirical evidence, Air Commodore Jasjit Singh says, of nearly 160 major armed conflicts since World War II, an overwhelming majority have taken place in the territories of developing countries, especially in Asia and Africa.

Developed countries intervened directly in about 73 per cent of the cases. Indirect interventions by developed countries in the form of arms supplies, political moves, or threat of use of force were present in some form or the other in all the armed conflicts.

The study says two super powers have resorted to demonstrative use of force without war on over 426 occasions since world war II, the target and focus of the threat has mostly been developing countries.

There has been a perceptible increase in the strategy of resorting to coercive diplomacy since the onset of the second cold war in 1978.

The study says there have been at least 28 incidents involving threats of use of nuclear weapons all except one (Berlin crisis) related to conflicts and their resolution in the territories of developing countries.

Another aspect of nuclearitation and its far-reaching implications, is the capability of the non-nuclear states to acquire nuclear weapons through clandestine programmes.

Citing an example, the study says "Pakistan is believed to be well on its way to acquiring nuclear weapon capability through similar clandestine means."

It says that transfer of high-technology arms and systems on a selective basis to a developing country, not only creates rapid and significant shifts on the local or regional balances of power, but can have implications in terms of the implicit threat of nuclear weapons inherent in a possible intervention by a developed country.

The study says transfer of arms and technology with dual capability and use, therefore, "creates favourable conditions to support a clandestine nuclear weapons programme by a developing country."

The real threat to the world, especially to developing countries, emanates from the nuclear doctrine legitimised by nuclear weapon powers and the proliferation of nuclear weapons by them.

The study says if the nuclear weapon powers are serious about non-nuclearisation, they must set an example by at least stopping the proliferation of nuclear weapons beyond their territorial limits.

The study concludes since the stakes of developing countries are tremendous, it is only logical that they should be considered a party to any dialogues, discussions and negotiations concerning nuclear arms control and disarmament.

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CSO: 5150/0079

ARTICLE REACTS TO MILHOLLIN ALLEGATIONS ON HEAVY WATER

Bombay THE TIMES OF INDIA in English 5 Feb 86 p 8

[Article by K. Subrahmanyam]

[Text]

MR. Gary Milhollin, currently a scholar in residence at the National Resources Defence Council in Washington, has published a study in which he has sought to infer that India had a shortage of nearly 200 tonnes of heavy water while commissioning the Madras atomic power plants (MAPP I and II) and the Dhruva reactor. He concludes that, in order to start these reactors, India must have illegally diverted heavy water from two other Indian reactors in Rajasthan, under safeguards, and also that India must have imported heavy water secretly from China. He calls upon the Reagan administration to begin an immediate enquiry into India's heavy water programme and to make public what it knows about India's nuclear intentions.

Mr. Milhollin relies on the Indian heavy water production data from a series of articles in *The Times of India* (May 6-9, 1984) written by Mr. Praful Bidwai and also for the information that 100 tonnes of reactor-grade heavy water was transported from Bombay to Madras before the start-up of MAPP I.

Import Estimate

Mr. Balachandran, in an article in the *Indian Express* (November 23, 1985), also concluded that India should have imported some heavy water and estimated the import at 70-90 tonnes. Mr. Balachandran's calculation of shortages is arrived at on the basis of his own guestimates of heavy water production in India—39.3 tonnes in 1983-84 and 55 tonnes in 1984-85.

Mr. Milhollin, on the other hand, proceeds on the basis that the heavy water production continues to be at the levels reported in Mr. Bidwai's articles of May, 1984. Both of them do not appear to have adequately appreciated the vastly improved performance of heavy water plants at Tuticorin, Baroda, Nangal and Kota in the last two to three years.

In the recent Shri Ram memorial lecture, Dr. Raja Ramanna, while declining to give the production figures of heavy water plants, stated that India was *almost* self-reliant in heavy water requirements and that imports of heavy water were either non-existent or *marginal*

Mr. Balachandran enumerates Canada, the USSR and China among the possible suppliers of heavy water to India, while Mr. Milhollin zeroes in only on China since he believes that Canada or the Soviet Union, as signatories of the non-proliferation treaty and members of the London suppliers' club, would not have supplied heavy water to India without international safeguards. Both of them use the term clandestine import and Mr. Milhollin goes further and charges India with apparent violation of her international obligations (without specifying what exactly they are).

India would not have violated any international obligation even if the conclusion on imports is accepted since India is not a signatory to the NPT or any other international contractual obligation. Mr. Milhollin is, therefore, barking up the wrong tree.

Diverting Attention

There appears to be a reason why he does so. The signatories of the NPT and the London suppliers' club have been merrily violating all safeguards and international obligations under the non-proliferation treaty. He wants to obfuscate the issue and divert attention away from the supply side to the recipient side. Therefore it is worthwhile to look at the leakages of materials from signatories to the NPT and consequently the blackmarket in nuclear equipment and materials.

The United States lost over 36 pounds of highly enriched uranium as on October 31, 1965. According to the testimony before the U.S. nuclear regulatory commission it was reasonably certain that this weapon-grade uranium ended up as weapons in Israel. (Incidentally Mr. Milhollin was a former consultant to the nuclear regulatory commission). In 1976 the U.S. General Accounting Office reported that tens of tons of nuclear material was missing from 34 uranium and plutonium processing plants around the country. It is not possible to prove that this material has not been stolen and diverted into the blackmarket.

The gaseous diffusion uranium enrichment plants at Oak Ridge and

Kentucky lost 150 lb. in a short span of five months in 1983-84. In 1979, in the North Carolina plant of General Electric Company an employee stole 65 kg. of enriched uranium in powder form. He was caught and sentenced to 15 years of imprisonment.

In April, 1985, following an anonymous threat, unusually high levels of radioactive plutonium-239 were found in New York city's water supply. Mayor Koch confirmed that PU 239 was introduced into the water supply though not at levels to cause any hazard to the population. PU 239 could have come only from a military facility or a weapon laboratory. A former director of nuclear materials safeguards for the U.S. Atomic Energy Commission once declared that the fissionable materials unaccounted for in three U.S. diffusion plants alone were in tons. A former commissioner of the U.S. nuclear regulatory commission made it clear that the commission's investigation into inventory discrepancies was only a ritual. Nobody really believed in the materials accounting system of the U.S. plants.

Another commissioner of the U.S. atomic energy commission has speculated about a supply stimulated black market for such fissile and other materials. Recently a French journalist was able to conclude a deal in the blackmarket for enriched uranium of weapon grade for 18.7 kg. and a kilogram of plutonium. The seller was prepared to deliver the material within 20 days of payment.

In this country it is not realised that the IAEA only carries out an audit of material accounting balance in those plants which are designated for its inspection and is in no position to verify or check the diversion of nuclear materials by nuclear weapon powers or from facilities which are not under its inspection jurisdiction.

Some of the nuclear weapon states which are party to the NPT have taken a lackadaisical attitude towards transfer of fissile materials, equipment and technologies to favoured non-nuclear client states.

Israeli Arsenal

According to a former CIA deputy director, Mr. Carl Duckett, President Johnson, even while acceding to the NPT, had been informed of the Israeli nuclear arsenal and the diversion of enriched uranium from the U.S. military facility at Apollo, Pennsylvania, to that country. Yet cynically the U.S. got all nuclear military facilities exempted from inspection under the NPT, presumably to avoid detection of such losses and diversions. Till now the U.S. has not thought of invoking the Symington amendment which prohibits aid to countries believed to be making nuclear weapons against Israel. The same favoured treatment has been extended to Pakistan. Though the Symington amendment was invoked by the Carter administration against Pakistan, it has now been waived permanently by the Reagan administration. President Reagan tells Congress that Pakistan continues to persist in its efforts to reach nuclear weapon capability though, according to the U.S. administration, it is still not in possession of a weapon or an explosive device which statement may only be a technically accurate verbal cover-up to describe what is known in strategic literature as the last-wire concept.

Since the last wire is not connected up, the assembly is not yet a weapon and, therefore, the country concerned is certified to have no weapons. The world has taken note of the fact how leniently the Pakistani, Nasim Ahmed Vaid, who attempted to export krytron timing devices out of the U.S. in contravention of that country's export regulations to Pakistani nuclear establishment (project 706), was treated by the American court. The same linient treatment was extended in Canada to the Pakistanis caught in the act of contravening Canadian export regulations for the benefit of project 706.

Pakistan has proved to the world what a sham the non-proliferation commitment of Western industrialised nations is. After the French formally cancelled their contract for the Pakistan plutonium reprocessing plant, the concerned French firm exported most of the equipment to Pakistan via their Italian subsidiary — Alcom. Two Swiss firms Kora Engineering Corporation and Vat, supplied various component systems for the uranium enrichment plant in Pakistan. The irony of it was that these shipments were cleared by Mr. Claude Zangge who prepared the list of equipment not to be exported by the London supplier's group of countries without IAEA safeguards.

A German firm established the entire fluoridation plant at Multan for Pakistan to convert uranium into gascous uranium hexafluoride. A Dutch company supplied the tubes required for the centrifuges at Kahuta. Pakistan had been running an European office headed by one Mr. S. A. Butt to buy equipment all over Europe for its uranium enrichment plant.

The above illustrations would reveal that there is a very large black-market in special nuclear materials, and equipment required for various nuclear activities, in the Western countries which claim to be subscribers to the NPT. The silence of the Western governments and the IAEA on this issue in spite of all these well-known facts published in the Western media would tend to suggest that these governments and the agency are not ignorant and innocent but connive at these transactions.

Permissive Attitude

Consequently, in the international market placé, weapon grade uranium and plutonium, heavy water and equipment to put up reactors and gas centrifuges are all available, thanks to the hypocritical and permissive attitude of the nuclear weapon powers and the associated major industrial powers of the Western world.

From time to time China has also been accused of putting into the market place such materials. The international nuclear black market, as the one in respect of arms sales, is so intermeshed that the buyer need not know which nation is the originator of the material.

This should explain to the naive and innocent, good-hearted and well-intentioned in this country why India is not prepared to accept either IAEA inspection or mutual inspection as satisfactory solutions to the problems of nuclear proliferation.

Even Mr. Milhollin casts aspersions on the IAEA safeguards procedures by hinting at diversion of heavy water from the safeguarded Rajasthan atomic power project (RAPP I). The IAEA inspection team has inspected and satisfied itself on the accountability of every gram of heavy water in those plants and yet that does not satisfy a former consultant to the U.S. Nuclear Regulatory Commission. It is natural for the Western countries to have reservations about the IAEA procedures since they have been running rings round them all these years.

In spite of their being a total break-off in the Indo-U.S. nuclear relationship, Mr. Milhollin claims that the U.S. is India's biggest nuclear supplier. His call to the U.S., Canada and the USSR to suspend further nuclear supplies to India is futile because none of them is currently a supplier. His suggestion to discontinue nuclear trade with China, till it clears itself up in respect of supply of heavy water to India, is not likely to evoke any reaction since the U.S. Congress has swallowed, under the Administration's pressure, even past Chinese help to Pakistan in the design of nuclear weapons and ratified the U.S.-China nuclear cooperation agreement.

Three-Stage Plan

India's nuclear intentions have been made public loud and clear — to proceed with its three-stage nuclear energy programme as spelt out by Dr. Homi Bhabha years ago, with an immediate objective of 10,000 MWE of power by year 2000.

To that one may add what Gen. Sundarji stated while assuming office as Chief of the Army Staff in a message of reassurance to the armed forces. He said that the Indian government would not make the armed forces fight their adversary at a disadvantage in respect of possession of nuclear weapons if that situation was forced upon India. The U.S. is very well placed to answer the question whether such a situation will develop in the sub-continent in the light of their permanent waiver of the Symington Amendment in respect of Pakistan.

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CSO: 5150/0073

STATEMENT SUPPORTS GORBACHEV PROPOSAL ON N-WEAPONS

BK021451 Delhi ISI Diplomatic Information Service in English 1435 GMT 3 Mar 86

["Statement by official spokesman on 2 March, 1986"]

[Text] The Soviet ambassador to the Committee on Disarmament, Dr. Victor Lo Israelyan, visited New Delhi from February 27 to March 2 as a special emissary of the government of the USSR, to explain details of some of the new proposals on disarmament put forward by General Secretary Gorbachev. The Soviet emissary discussed how these proposals could be pursued further in international organisations and through other means.

During this stay in Delhi, Mr Israelyan called on the external affairs minister; chairman (PPC) [Policy Planning Commission]; MOS (EA) [Minister of State for External Affairs]; foreign secretary; and secretary (EAST). The Indian delegation to the talks was led by Shri M. Dubey additional secretary.

The Indian side reiterated India's position that General Secretary Gorbachev's proposals on the elimination of nuclear weapons were bold and constructive. They expressed the hope that these proposals would receive due consideration by the international community and, particularly, the nuclear weapon powers.

The Indian side referred to the recent initiatives in the field of disarmament taken by India. The Indian proposal for a comprehensive ban on testing of nuclear weapons and for a moratorium on such tests as an immediate interim measure was also referred to.

In this context, the Indian side also referred to the details of six-national disarmament initiative.

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CSO: 5150/0077

INDIAN, SOVIET DOCTORS EXPRESS CONCERN OVER NUCLEAR THREAT

Madras THE HINDU in English 3 Mar 86 p 12

[Text]

MADRAS, March 2.

Indian and Soviet doctors expressed their concern over the increasing likelihood of a nuclear war and professed their determination to educate the public on the threat of nuclear holocaust, at a two-day Indo-Soviet medical symposium which began here on Sunday.

Inaugurating the symposium, the Tamil Nadu Health Minister, Dr. H. V. Hande, deplored the escalation of the arms race and the consequent build-up of military budgets, particularly in the developed countries, and said that defence spending took away funds that would have gone to health care and other welfare measures. He suggested that the developed countries should pare their military budgets and pass on the funds to some international body like the World Health Organisation for investing in healthcare projects.

Medical practitioners, as scientists who were in touch with the masses, should generate public awareness on the effects of nuclear war, Dr. Hande said. He hoped that there would be a fruitful exchange of ideas between the Soviet team and its Indian counterparts, and offered the State Government's cooperation in launching a scheme for information exchange on the latest Soviet medical technology for application in Indian hospitals.

'Dangerous time': Mr. Vadim Cherapov, Consul-General of the USSR in Madras, said that the world now faced a difficult and dangerous time, particularly after the "not so encouraging" American reply to the Soviet leader, Mr. Mikhail Gorbachev's proposals for a programme of total elimination of nuclear weapons. Washington had reaffirmed its determination to go ahead with its "Star Wars" programme and the situation called for action from people from all walks of life. He hoped that the day's discussions on "The struggle against the nuclear threat" would promote the international movement for peace.

Dr. Y. N. Belenkov, Dr. A. Kaydash and Dr. A. K. Svichulis, from the Soviet side, laid emphasis on the need for physicians to join the international struggle for peace. The pace had been set with the creation of the International Physicians for Prevention of Nuclear War, which now had more than 200,000 members from 41 countries. Physicians and medical students ought to educate the public on the ill-effects of nuclear war and the prospect of a nuclear winter.

Attitude development: Dr. A. Sankaran, cardiologist, Government General Hospital, Dr. M. Natarajan, orthopaedic surgeon and Dr. R. Janardhanan, Organising Secretary, National Association of Indian Doctors for Prevention of Nuclear War, Pondicherry, stressed the need for doctors here to join the international movement. They said that apart from imparting skills to medical students, attitude development was also important for fostering awareness of the dangers of nuclear war.

A resolution was also passed, affirming the determination of the Soviet and Indian doctors to work in the struggle against the threat of nuclear war.

The meeting observed a minute's silence to respect the memory of the slain Swedish Prime Minister, Olof Palme.

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CSO: 5150/0082

EXPERT TELLS CHALLENGES FACED BY NUCLEAR INDUSTRY

Madras THE HINDU in English 5 Feb 86 p 19

[Text] Some of the biggest technical challenges ahead in India's nuclear programme, lie in the areas of heavy engineering fabrication and materials technology, said Dr Placid Rodriguez of the Indira Gandhi Atomic Research Centre, Kalpakkam.

Dr Rodriguez, head of the metallurty programme of the Reactor Research Centre, was giving the second public lecture on January 27 at Ernakulam, organised by the Kerala Shastra Sahitya Parishat, as a curtain raiser to its annual conference this month.

He said based on the expertise being gained with the Fast Breeder Test Reactor (FBTR), the department would go ahead with designs for a prototype fast breeder, much more complex and massive than the test vessel. The reactor vessel diameter would be 15m while the FBTR was only 0.26m. It would be 14.5m tall as compared to the present 0.6m. And it would require 2600 tonnes of liquid sodium as coolant--where the present coolant totalled only a 1000 tonnes.

As a result, a quantum jump in heavy engineering capability was called for. The problems were as much on the shop floor as in the laboratory. He identified key areas where the engineering industry would find the biggest challenges: fabrication of components for use within the core area--largely involving type 316 stainless steel; steam generation components in ferritic steel; advanced welding techniques, some of which are already being attempted in the Welding Research Institute at Tiruchi and simulation studies on radiation damage and effects by using accleratora.

Dr Rodriguez said for components built for such high ambient temperatures like 500°C and beyond, there were no internationally available design codes and standards. India would have to evolve its own design codes for materials working at such temperatures, as will in high sodium and neutron environments.

The use of the carbides of plutonium and uranium in the FBTR rather than the oxides as done by all other nations, was itself part of futuristic planning. He said, "a calculated risk" had been taken, so that the breeder technology was still up to date in the 2020s. By 2050, he said, by present projections, even the class of plutonium breeders would become obsolete, and India plans to go over to thorium breeders, using natural resource available in Kerala, as a source of Uranium 233.

By then India would have a whole new class of engineering challenges.

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CSO: 5150/0074

MP ALLEGES EXPLOSION AT BHABA ATOMIC RESEARCH CENTER

HK150624 Hong Kong AFP in English 0556 GMT 15 Mar 86

[Text] New Delhi, March 15 (AFP) — Seven scientists were seriously injured and many others exposed to radiation in an explosion at India's Bhaba Atomic Research Centre (BARC) near the western city of Bombay, an opposition MP has alleged.

Janata Party MP V. Venkatesh told the PRESS TRUST OF INDIA news agency in Bangalore, southern India, on Friday that the blast had occurred two weeks ago.

Dr. Venkatesh raised the issue in the lower house of Parliament earlier on Friday.

But the speaker (presiding officer), refused to allow the MP to ask about he alleged incident, saying it was not the way to raise the matter.

"The people of the country want to know what was the cause of the blast," Dr Venkatesh said.

He urged the government to take steps to prevent radiation leakage.

There was no comment from either the government or the authorities at the centre.

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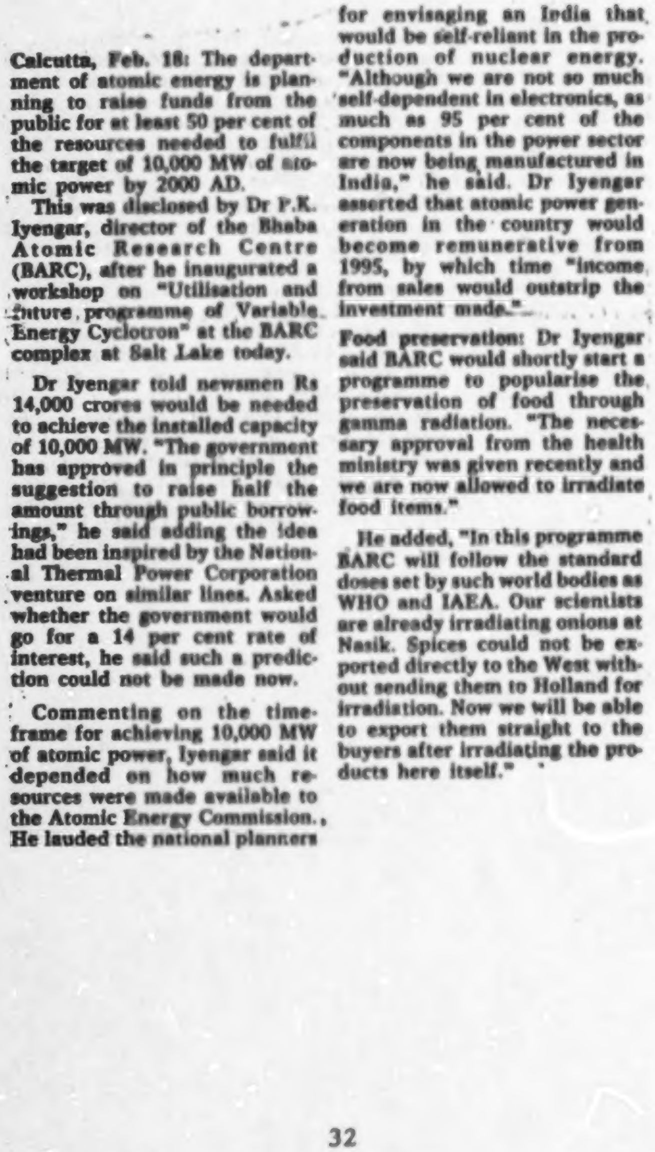
CSO: 5150/0083

PUBLIC BORROWINGS TO FINANCE NUCLEAR PLANS

Calcutta THE TELEGRAPH in English 19 Feb 86 p 1

[Text]



Calcutta, Feb. 18: The department of atomic energy is planning to raise funds from the public for at least 50 per cent of the resources needed to fulfil the target of 10,000 MW of atomic power by 2000 AD.

This was disclosed by Dr P.K. Iyengar, director of the Bhaba Atomic Research Centre (BARC), after he inaugurated a workshop on "Utilisation and future programme of Variable Energy Cyclotron" at the BARC complex at Salt Lake today.

Dr Iyengar told newsmen Rs 14,000 crores would be needed to achieve the installed capacity of 10,000 MW. "The government has approved in principle the suggestion to raise half the amount through public borrowings," he said adding the idea had been inspired by the National Thermal Power Corporation venture on similar lines. Asked whether the government would go for a 14 per cent rate of interest, he said such a prediction could not be made now.

Commenting on the timeframe for achieving 10,000 MW of atomic power, Iyengar said it depended on how much resources were made available to the Atomic Energy Commission. He lauded the national planners for envisaging an India that would be self-reliant in the production of nuclear energy. "Although we are not so much self-dependent in electronics, as much as 95 per cent of the components in the power sector are now being manufactured in India," he said. Dr Iyengar asserted that atomic power generation in the country would become remunerative from 1995, by which time "income from sales would outstrip the investment made."

Food preservation: Dr Iyengar said BARC would shortly start a programme to popularise the preservation of food through gamma radiation. "The necessary approval from the health ministry was given recently and we are now allowed to irradiate food items."

He added, "In this programme BARC will follow the standard doses set by such world bodies as WHO and IAEA. Our scientists are already irradiating onions at Nasik. Spices could not be exported directly to the West without sending them to Holland for irradiation. Now we will be able to export them straight to the buyers after irradiating the products here itself."

/9274
CSO: 5150/0075

CYCLOTRON CENTER PLANS TO INSTALL NEW ACCELERATOR

Calcutta THE TELEGRAPH in English 19 Feb 86 p 4

[Text]

Calcutta, Feb. 18: The Variable Energy Cyclotron Centre (VECC) at Salt Lake is planning to instal another accelerator in addition to the one functioning now. The proposed facility will augment the energy of particle beams to 50 million electron volts (MeV), according to Dr A.S. Divatia, director, VECC. He was speaking at a workshop on utilisation and future programmes of variable energy cyclotrons at the VECC today. The workshop was inaugurated by Dr P.K. Iyengar, director of the Bhabha Atomic Research Centre (BARC).

According to Dr Divatia, there is a heavy demand for using present cyclotron for producing radioactive isotopes needed for studies in higher physics, engineering and medicine. Describing the rush for booking by users "as bad as witnessed in railway travel," he said: "Such a heavy pressure on the cyclotron operating time makes it very difficult to use this facility exclusively for production of isotopes. A sophisticated cyclotron as this one has a high operating cost of Rs 5,000 per hour."

He said the workshop had been necessitated to assess the future programme of the users. "A comprehensive view of this will help us arrive at programmes of research which are of greater interest from the fundamental point of view," he said.

Comparing the performance efficiency of the present facility to "any other machine of its kind," Dr Bikash Sinha, head of the computer division of the VECC, said in his welcome address that the expertise developed by building this cyclotron almost indegineously had yielded rich dividends. "We have now at hand well-trained experts, both scientists and engineers, at par with the rest of the world, in the classical tradition of Homi Bhabha's dream," he commented.

According to Dr Sinha, the expertise developed at the VECC was now helping its scientists "to look deep into the future." He said, "We hope to produce beams of particles heavier than alpha soon." The construction of another cyclotron on the campus will help the VECC arrive at "a scenario where the frontiers of international physics lie," he said.

/9274
CSO: 5150/0076

INDIA

BRIEFS

KALPAKKAM REACTOR PERFORMANCE--Bombay, 3 Feb (PTI)--Mr S. N. Seshadri, an associate director of the Bhabha Atomic Research Centre (BARC), died here yesterday following a massive heart attack. He was 49. Mr Seshadri had made significant contributions to the control system of the Purnima and Dhruva reactors. [Text] [New Delhi PATRIOT in English 6 Feb 86 p 5] /9274

BARC OFFICIAL DIES--Varanasi, 5 Feb (UNI)--India will be capable of generating 10,000 MW of nuclear power by 2000 AD, according to Dr C. V. Sundaram, director of the Indira Gandhi Centre for Atomic Research, Kalpakkam. Talking to newsmen here yesterday, Dr Sundaram said the successful commissioning and operation of the fast breeder test reactor at Kalpakkam recently, had established that the carbide fuel had superior breeding capability with a higher power growth rate than the conventionally used oxide fuel. He said at present, the Kalpakkam reactor was using indigenous mixed carbide fuel developed by the Bhabha Atomic Research Centre. The fast breeder test reactor at Kalpakkam marked the beginning of the second phase of the country's nuclear power programme. Dr Sundaram said the country was relying almost on its own resources in the atomic energy field by using natural uranium and abundant thorium resources. He said with the possibility of an energy crisis in the 21st century, the only solution possible was utilization of nuclear fission energy and solar energy. He said of these fusion and solar energy utilisation were still in the experimental stage while fission power was considered safe, reliable and commercially proven. Fission power, he said, would be the major energy resource in the coming years. In future, atomic energy would be used in lesser application, high energy accelerator, technology of new temperature in physics and various other fields, he added. [Text] [Calcutta THE TELEGRAPH in English 4 Feb 86 p 5] /9274

CSO: 5150/0078

AL-QADHDHAFI PLEDGES NOT TO PRODUCE NUCLEAR BOMB

LD121119 Kuwait KUNA in English 0942 GMT 12 Mar 86

[Text] New Delhi, March 12 (KUNA) — Libyan leader Col Mu'ammar al-Qadhdhafi has called for "direct dialogue with India" to resolve all "misunderstanding that has arisen between Tripoli and New Delhi".

The Libyan leader in an interview published Wednesday in *THE INDIAN EXPRESS* daily expressed dissatisfaction over the feeble Indian response to the recent American threats to Libya. Libya sought India's help in its recent crisis, which led to escalation of tension in the North African region. It sent a message to Indian External Affairs Minister Bali Ram Bhagat, explaining its position.

Three months ago tension was high between Libya and the United States after Washington hinted that Tripoli was behind the December attacks on Rome and Vienna airports and American threats of reprisal [were] coupled with U.S. naval military maneuvers off the Libyan coast. Libya then sought but apparently failed to get India's denunciation of the American threats.

Libya is likely to send Major 'Abd al-Salam Jallud to India with the hope of further strengthening friendly ties between the two countries. He is also likely to hold wide ranging talks with Indian leaders on political, economic and other issues. Major Jallud visited India during the Janata regime and during the nonaligned meet in 1982.

The paper said the Libyans appear to be sensitive to the fact that the Indian Vice President Ramaswamy Iyer Venkataraman will be the formal host of Major Jallud. But they have been assured by the Indian Government that Indian Prime Minister Rajiv Gandhi will have separate talks with him.

(?Al-Qadhdhafi said) "During the American-Libyan confrontation the stand of India stopped short of what was expected." "India as chairman of the Nonaligned Movement should have expressed unrestricted support against this Zionist-American joint aggression". Al-Qadhdhafi spoke warmly of late Indian Premier Indira Gandhi whom he described as a great champion of the Nonaligned Movement. He said he was deeply moved and much "affected" by her assassination. The Libyan leader said "India has a special status and weight in the Nonaligned Movement".

He renewed a pledge that "Libya would never help Pakistan to acquire nuclear bomb. We consider nuclear weapons production a fatal mistake against humanity".

Referring to the 45,000 Indians, working in various government agencies in Libya, Al-Qadhdhafi said "they are our good friends and they are serious and diligent workers".

/8309
CSO: 5100/4607

PAKISTAN

BRIEFS

PARTY URGES NUCLEAR DEVICE--Gujranwala, 3 Mar: Mr Hanif Ramay, chief of Pakistan Musawat Party, while addressing the district bar here on Monday said that it had become imperative for Pakistan now to build a nuclear device. It was the only way to persuade India to develop friendly relations with Pakistan, he added. He said that those who think that Islam is not an essential philosophy for Pakistan, are living in a fools' paradise. He deplored that provincialism and parochialism had reached the climax in Pakistan. He referred to the Jamshoro University kidnappings and abductions in the connection. Rebutting the claim that parliamentary democracy had been restored in Pakistan, he said, if that was so, how come the president in his capacity as chief of the Army Staff, subservient to the prime minister, while the premier himself could be sacked and the National Assembly could be dissolved by the president. The chief of the Muszwat Party dismissed the concept of confederation and said that it was a martial law product. He strongly condemned feudalism and said that living conditions of the downtrodden could not be improved unless the feudal lords and generals were eliminated from politics. [Text] [Karachi DAWN in English 4 Mar 86 p 2 GF] /9274

CSO: 5100/4736

SOUTH AFRICA'S NUCLEAR CAPABILITY, U.S. AID ASSAILED

MB070520 Moscow in Zulu to Southern Africa 1800 GMT 5 Feb 86

[Vladimir Voyevodov commentary]

[Text] Ten years ago, on 5 February 1976, the South African parliament passed a bill concerning the security of that country. The provisions of this bill are such that South Africa may use whatever means at its disposal against any country if the South African regime feels threatened. Let us now listen to a commentary prepared by Vladimir Voyevodov on this issue.

Ten years ago, the racists changed tactics following victories in the liberation struggles in Angolan and Mozambique where the chains of oppression were broken and the oppressive Portuguese regimes sent packing. The independent African countries posed a threat to the regime's ability to continue the suppression of the liberation struggle in southern Africa. A bill was therefore hurriedly approved to further strengthen the security of South Africa and in so doing it provided for aggression against its neighbors.

The racists have caused extensive damage in their undeclared war in Angola, but they did not stop there. They are committing aggression against their independent neighbors like Mozambique, Lesotho, Botswana, and others. In order for the regime to continue its repression in South Africa, there is a need for more modern weaponry, which is used increasingly with the help of the West, particularly the United States.

Even though the UN Security Council passed a resolution imposing sanctions on the provision of arms to South Africa in November 1977, the consignments from the West have increased. The regime has also greatly increased its armament industry, again with the help of the West. South Africa's armament industry, the Armaments Development Corporation of South Africa today manufactures some Western weapons under license and even exports some overseas. All this has helped South Africa to be among the top ten best armed nations in the world.

Today South Africa poses a threat not only to the African continent, but to the whole world. The great danger is that the racists are plotting to acquire weaponry that can annihilate large numbers of people, chemical, biological, nuclear weapons. There is growing opportunity for South Africa to attain nuclear capability because of the United States. South Africa is one of the countries that refrained from signing an agreement against use of nuclear weaponry. Lately there has been growing talk in Africa of the presence of biological weapons in South Africa that can discriminate on the basis of race. These are meant to selectively kill the black race and leave out the white race. Such diabolical weapons are being researched and manufactured with the aid of the United States.

On many occasions, those advocating apartheid have bragged to Africa and the international community that they are prepared to defend their racist policies and are willing to spill as much blood as will be necessary to maintain them.

The South African regime has become a threat to world peace. Therefore, the onus is on all humanity to work towards its downfall to preserve peace.

/6662
CSO: 1812/84

NUCLEAR POWER PLANT TO BE BUILT WEST OF HUMANSDORP

Cape Town DIE BURGER in Afrikaans 16 Dec 85 pp 1, 2

[Article by our correspondent: "Nuclear Power Planned near Humansdorp"]

[Text] Port Elizabeth--South Africa's second nuclear power plant will probably be built west of Humansdorp.

A press officer from EVKOM [Electrical Supply Commission], Marius Rautenbach, who last week flew over possible sites for a nuclear power plant in the Humansdorp area with newsmen, told DIE BURGER that preliminary indications are that the project will probably be built west of Humansdorp. Land speculation would not be advisable, however, since the plant will require only 4.5 km of the coast and an area 2 km in from the coast.

Private Property

According to Rautenbach, EVKOM is engaged in a comprehensive investigation that will take 6 years and will study 19 proposed coastal areas.

The first study is that in the Humansdorp area. This stretches from Cape St Francis to near the mouth of the Tsitsikamma River and includes about 60 km of coast. The land in this area is largely in private possession.

The second area to be investigated is east of Port Elizabeth and stretches about 80 km from the mouth of the Sondags River to near Cape Padrone. Most of the land in this area belongs to the Forestry Directorate.

The location of the other 17 areas has still not been revealed.

In the area east of the Sondags River to near Woody Cape, geologists have already found three earth faults from the air, which makes this area unacceptable. The site must also be so located that power can easily be distributed across the country through the transmission system.

Rautenbach said that the search for a suitable site has already been reduced from 2,400 km of coastline to 610 km. This project will bring 7,000 people to the area, of whom only 2,000 will remain when the nuclear power plant is completed.

DIE BURGER was told that the necessary infrastructure with churches, hospitals, and schools will be required for such a project.

Four Units

EVKOM's policy is no longer to create satellite towns, but rather to have workers commute up to 40 km to the site. A town like Humansdorp for instance will be approached for this, and EVKOM will help finance it.

The proposed nuclear power plant will be similar to Koeberg, which consists of two units. EVKOM plans to provide another four units.

12593/12859
CSO: 5100/13

ESCOM DEVELOPING LONG-TERM NUCLEAR ENERGY STRATEGY

Cape Town THE WEEKEND ARGUS in English 15 Feb 86 p 5

[Text]

JOHANNESBURG. — Escom is developing a long-term nuclear energy strategy, and has reserved possible sites along South Africa's coastline for the construction of a network of new nuclear power plants for the future.

This has been disclosed by Escom chairman Mr John Maree and senior general manager Mr Ian McRae, who said that although there was no immediate blueprint for a second Koeberg, it was inevitable that nuclear energy would be a chief source of power in South Africa by the turn of the century.

Nuclear energy was a positive option — and South Africa could have its second nuclear plant within 10 years.

After announcing a dramatic restructuring programme, Mr Maree and Mr McRae lifted the lid on Escom's plans in the nuclear energy field.

26 stations

They said provisional sites had been selected along the Western and Eastern Cape coasts and in Natal.

Escom operated 26 power stations, mostly coal-fired, which generate 94 percent of South Africa's electricity needs, or 60 percent of all power produced in Africa.

It also supplied all or part of electricity consumed in Lesotho, Swaziland, Mozambique and Botswana.

While, for the time, South Africa was well-stocked with coal reserves, nuclear power was a viable alternative source as Koeberg, which generated more power than 12 alternative plants in the Cape and the hydro stations in Natal, had shown.

/9317
CSO: 5100/18

U.S. AIDS PAKISTAN, RSA, ISRAELI NUCLEAR PROGRAMS

WA181645 Moscow KOMMUNIST VOORUZHENNYKH SIL in Russian No 23, Dec 85 pp 80-84

[Article by Lieutenant Colonel V. Poshchpkin under the rubric "On International Subjects": "The Thieves and Their Patrons"]

[Text] "A group of dingy concrete structures surrounded by a barbed wire fence rose above the surrounding dunes. We drove up to them. There was not a soul around, it seemed. When the cameramen attempted to film the facility for television, however, they were immediately seized by security agents who appeared out of nowhere. An officer ordered us to leave the area...."

One might say that American journalist David Willis, whose report is excerpted above, was lucky. Willis completed the trip to a desert area of Pakistan on the shore of the Arabian Sea, safe and sound. His colleague, a British reporter, was not so lucky, according to the London newspaper FINANCIAL TIMES.

...In the town of Kahuta 40 km from Islamabad there is a facility which officials call a "modest research establishment." The development of research in Pakistan, one of the poorest Third World nations? Is this not a subject for an article in the press? It is doubtful whether the British reporter who left for Kahuta, where the "scientists" work, anticipated how his trip would end. The Briton was beaten up and arrested as soon as he approached the facility which was the object of his interest.

Only a few years ago many people went to this town to relax on their days off. Today, according to the Western press, the roads leading to it are controlled by Army subunits and security forces, and antiaircraft missile systems have been set up on nearby hills. Despite efforts by the authorities to squash (in the literal sense) the journalists' desire to visit Kahuta, the purpose of the "establishment" located there, like the facility on the shore of the Arabian Sea, became known.

Contrary to statements by the authorities on the peaceful nature of the plant in Kahuta, its products are designated for military purposes. And not just military purposes. This highly guarded enterprise, the newspaper THE WASHINGTON POST reports, will provide enough fissionable material to produce an atomic bomb. The experts, the newspaper stresses, believe that this is just a matter of time.

A Bomb in the Basement

It has been learned that a secret plan by certain circles in Pakistan whose objective was to create the "first Islamic" atomic bomb was code-named Project 706. In addition to the above-mentioned facilities, an enterprise for processing nuclear fuel at Chashma, the Pakistan Institute of Nuclear Research and Technology, and others mentioned in the foreign press are also contributing to the realization of this ambitious "project."

The aforementioned American journalist D. Willis writes that during a trip to a number of nations in Asia and Africa he succeeded in gathering irrefutable evidence that Islamabad, with the assistance of certain other states, is on the threshold of creating a nuclear weapon. And a UPI correspondent has reported from Islamabad that a nuclear device could be tested there within the immediate future.

Indian newspapers report that not long ago members of a parliamentary consultative committee of India's Ministry of Defense were shown a documentary film proving that Pakistan is truly close to creating an atomic weapon. The Indian MP's became convinced of the falsity of propaganda put out by authorities in Islamabad, who allege that the nuclear research program being conducted in the nation is for peaceful purposes. Members of the parliamentary committee were also informed that certain Western nations, including the USA, are participating in Pakistan's development of a nuclear weapon. It is from the West that Pakistan is obtaining the uranium and nuclear technology.

(G. Sokhni), a member of India's Institute for Defense Studies and Analyses, recently stated that the military administration itself had arranged for obtaining enriched uranium suitable for creating an atomic weapon. And Pakistan can even now actually be considered a state with "nuclear bombs in the basement." The Indian scientist stresses the fact that Ziaul Haq's regime has now begun the accelerated development of missiles for delivering nuclear weapons to targets 1,000 miles away.

There are foreign telegraph agency and press reports from many areas that the authors of Project 706 are working with feverish haste. One such report, from New York, created a lost of fuss. Authorities at the local Kennedy Airport confiscated some unusual cargo aboard an aircraft departing for Pakistan: more than 2 tons of zirconium, a metal used in nuclear technology. It was learned that the zirconium, disguised as ordinary baggage, had been secretly purchased by a former Pakistani serviceman. A specific detail of particular interest to journalists surfaced in the story: The arrested retired colonel turned out to be a personal friend of General Ziaul Haq, the Islamabad dictator....

Authorities in Islamabad recently arranged a splendid reception for a certain Nazir Vaid, who had flown in from the USA. What did he do to deserve this? one might ask. Posing as a businessman, Vaid had attempted to smuggle into Pakistan parts for installation on atomic bombs. The Pakistani spy, the American newspapers reported, was directly linked to those in charge of Islamabad's nuclear program. The surprising thing, however, is the fact that although American authorities arrested Vaid, they soon released him on the order of the Justice Department. He returned safely to Islamabad with fanfare, instead of serving a considerable term for espionage as he should have under American law....

Thanks to "businessmen" such as Nazir Vaid, scarce materials and equipment began to flow into Pakistan: pipes made of special steel from The Netherlands, evaporators and compressors from Switzerland. Technology and equipment involved in the production of enriched uranium and nuclear fuel, for which Islamabad's representatives launched a real hunt, also arrive from Canada, the FRG, Great Britain, and certain other nations. The British newspaper FINANCIAL TIMES has stated that the "special projects" are directed by Brigade General A. Syed, former chief of the Pakistani Army's Operations Directorate, who studied engineering in the United States.

And so, there is more than enough evidence in the foreign press that Pakistan is close to creating an atomic bomb. Even if we concede that some of the reports by the journalists are clouded by the sensationalism which is typical of the Western press, even so it would hardly be expedient to ignore them. The press reports, after all, only confirm that which has been stated from time to time by official people and establishments. CIA experts, for example, state that Islamabad will continue to stockpile fissionable material which can be used in the production of nuclear weapons.

Furthermore, statements like these have been made officially across the ocean, by representatives of the American Administration themselves. Speaking in the U.S. Senate, A. Cranston, Democratic senator from the state of California, acknowledged the following: "Pakistan now has potential sources of plutonium, which will be used in the production of nucelar weapons." Cranston fears that it will be impossible to monitor this process.

It is the assessment of the American ambassador to Islamabad, a fact published in the press, that Pakistan is already producing a large quantity of plutonium. Why plutonium? We know that an atomic bomb can be created with the necessary quantity of pure uranium or of plutonium. According to statements by Western experts, eight kg of plutonium can produce a 20-kiloton atomic bomb with an explosive force equivalent to that which destroyed Hiroshima in August of 1945.

And so, plutonium is one of the ingredients for producing such a weapon. The rest is just a matter of technology. Whether this or that power possesses it is another question. With respect to the uranium raw material, however, it wasn not clear for some time where Pakistan had obtained it. The question was then answered. From mines in Niger, which are controlled by Western companies.

But what about the technology? In order to clear this up, we need to dicuss a certain Abdul Qadir Khan, whose name is frequently mentioned in the Western press. This engineer directed construction of the uranium enrichment plant at Kahuta. Prior to that, according to the French magazine LE NOUVEL OBSERVATEUR, Doctor Khan managed to gain access to the technology for enriching uranium by centrifuging at URENCO, a West German-British-Netherlands consortium. And he is the one who originally directed the purchasing of industrial equipment abroad.

LE NOUVEL OBSERVATEUR, which informed its readers that Khan had assembled the necessary technical information, called him "one of the most talented spies of our time." It is certainly not just a matter of his espionage merits, however. Islamabad's nuclear pretentions became a possibility because imperialist circles of certain nations in the West connived with it. Nor should we forget the fact that the USA provides the Islamabad regime with large-scale military assistance, supplying it with conventional weapons. According to reports in the press, however, it is also receiving a large number of F-16's, the latest fighter-bombers and carriers of nuclear weapons. This is one more ominous line in the chronicle of connivance with Islamabad in its nuclear preparations....

Why did the White House give the green light to massive shipments of arms to Pakistan? After all, for several years prior to this Washington had refused to do this for Gen Ziaul Haq because of the nuclear program, which called for the creation of an atomic bomb. This factor has now been removed from consideration. Official Washington is actually closing its eyes to the Islamabad regime's nuclear preparations and rapidly arming it. The USA's military-economic assistance to Pakistan amounts to the enormous sum of $3.2 billion. And in September of 1985 representatives of the Washington Administration declared their agreement to make a new deal with Islamabad--this time in the amount of $6 billion!

Reliance on the shah of Iran, who was assigned the role of White House policeman in Southwest Asia and particularly in the vast Persian Gulf zone, as we know, was broken. The USA is now intensively promoting Pakistan as its policeman. In the reckoning of the oversea strategists, it could become the central link in the system for protecting American imperialism's "vitally important" interests in the Persian Gulf area and throughout the region. Islamabad is increasingly becoming the main staging area for the "undeclared war" against democratic Afghanistan and a transhipment base for the Rapid Deployment Force, the American corps for aggression and brigandage.

The massive shipments of military supplies, observers note, give Pakistan "the possibility to use its previously limited means to implement 'a nuclear program which was previously prohibited'." Nuclear programs do in fact require a great deal of money, and the standard of living for the working masses in the nation is extremely low. It is 24th among the 34 poorest nations of the world with respect to development. Instead of improving the lot of the masses, however, the authorities continue to spend a considerable portion of the funds for military purposes, including the infamous Project 706.

The dangerous pretentions of Gen Zia's military regime are producing deep concern in political and military circles of neighboring states, in all those who value peace, security, and political stability in Asia. Islamabad's nuclear preparations are especially alarming to India. The government of that nation has repeatedly stated that it is aware of Pakistan's attempts to acquire nuclear weapons, that India is keeping a close watch over Islamabad's efforts in this area. "If nuclear weapons appear on the Indian subcontinent, this will be the point of no return," Indian Prime Minister R. Gandhi has said. In a May 1985 interview with the French newspaper LE MONDE he stated the following: "We assume that Pakistan is very near to mastering nuclear weapons or already possesses them, and not just one."

The Islamabad example clearly shows the danger posed by the arms race problem and the spread of nuclear weapons over the planet. Receiving expensive technology, weapons, and military equipment from the West, primarily the USA, Pakistan is increasingly coming under military-political independence upon Washington and being drawn into the wake of its militaristic, aggressive course. The newspaper TIMES OF INDIA cites some remarkable statements by the aforementioned Senator A. Cranston to the effect that the USA appears to be deliberately contributing to the process of turning Pakistan into a "nuclear power." Indeed, the United States, a nation which signed the Nuclear Nonproliferation Treaty, is pursuing its own mercenary, imperialist, hegemonistic interest in the region by conducting a policy of connivance with and even secret support for Islamabad's nuclear ambitions. Observers point out an extemely important detail in this dangerous escalation of its connivance: As early as 1979 Islamabad was given to understand that the USA would not hinder its nuclear development projects if it would take a more active part in the implementation of American military-political strategy in Asia. "It is very important to America that Pakistan's nuclear bomb be in the hands of a friendly government," stated Pentagon chief C. Weinberger. One could not be more candid that.... And so, imperialist circles led by Washington have actually helped their Islamabad "friends" grab the "nuclear genie" by the beard. Disregarding everything, Islamabad is dragging the genie into its secret basements.

This is why millions of Pakistanis are opposing the nation's subordination to oversea interests and the excessive military outlays. Participants in the antigovernment demonstrations which have developed in the nation and which are involving increasingly broader segments of the population, are also opposing American "aid" to Pakistan and the latter's use as a staging area for the undeclared war against democratic Afghanistan.

The Nuclear Missile Tandem

More and more nations of the capitalist world where reactionary regimes are in power are becoming infected with the virus of nuclear ambitions. The harnesses for the nuclear chariot are being actively prepared in secret recesses in the military-political basements of Zionist Israel and the racist Republic of South Africa.

The foreign press frequently carries reports on sudden "disappearances" of uranium. And not just from somewhere, but from the territory of the United States. Such "sales" have been made at enterprises of Pentagon subcontractors in the USA, among others, a fact reported in American publications at the beginning of 1984.

We need only mention the "disappearance" of 110 kg of enriched uranium from a plant for the production of nuclear fuel in the city of Erkin, Tennessee, and 198 kg at a facility for the production of nuclear fuel for submarines in the city of Apollo, Pennsylvania. At that time the authorities attempted to blame everything on some mythical "terrorists." A hue and cry was raised, and the terrorists were sought among the personnel, but in vain. The "terrorists" were not found, and the uranium continued to disappear in greater and greater quantities.

More than 80 kg of enriched raw material "disappeared" from a secret facility for the production of nuclear weapons at Oak Ridge, Tennessee, between 1979 and 1982 alone. More than 85 atomic bombs could be prepared from all of the materials which have "disappeared" from Oak Ridge over the past 35 years. This is stated in secret documents which came into the possession of the information service of the Scripps-Howard Newspaper Trust.

It is difficult to accept the "impotence" of American authorities in their attempts to find the "disappearing" uranium and the thieves. Some newspapers have openly stated that the uranium which disappeared in the USA under "inexplicable" circumstances should be sought in Israel and the Republic of South Africa. Those nations, the American publications stressed, are secretly importing the raw materials necessary for producing atomic devices.

According to TIME magizine, at the very beginning of the Zionist state's establishment, its ruling circles were infected with the dangerious nuclear virus. Hayim Weizman, a chemist and Israel's first president, did everything possible to encourage the Jewish atomic scientists who arrived in the "promised land." The Israeli specialists extracted low-grade uranium from phosphates in the Negev Desert and developed an effective technological process for producing heavy water.

In exchange for this information, Israel obtained permission to take part in atomic test tests in the Sahara. Later, with the assistance of certain circles in the USA, France, and the FRG, the Israelis established their own atomic research center at Dimona in the Negev Desert. The facility was called a "textile factory" to protect its secrecy. Certain specialists abroad believe that Tel Aviv conducted underground nuclear tests in the Negev Desert as early as 1963, after which the Israeli atomic scientists began preparing the materials for atomic bombs.

A number of foreign publications have cited convincing evidence that Tel Aviv already has the so-called "judgment day weapon," although officially Israel's leaders neither confirm nor deny this information. They are demonstrating sensitivity, so to speak, toward their overseas patrons, among whom dozens of Israeli atomic scientists have served their apprenticeship. Even back in the 50's those patrons generously forked out $350 million to Tel Aviv for nuclear tests. E. Teller, the "father" of the American hydrogen bomb, who repeatedly advised the Israeli atomic scientists, admitted: "I frequently visit Israel. The Israelis tell me everything they know. I tell them everything I know...."

In the "promised land" itself some of the "hawks" openly speak of its nuclear weapons. Reserve General E. Raviv expounds: "Due to the fact that sources for building up the Israeli Army with personnel have practically been exhausted, we must have a qualitatively new stage of armament, a nuclear stage, in order to enhance our militaristic [militaristskiye] efforts." The British newspaper SUNDAY TIMES stated in May 1984: "After the Arab-Israeli war of 1973, the CIA and the French intelligence service independently concluded that Israel must have its own nuclear arsenal. They agree that Israel now has more than 30 units of nuclear weapons and is producing more and more bombs, approximately two or more a year."

And what is the present Washington Administration's attitude toward Zionist Israel's nuclear programs? The White House simply ignored reports that a nuclear device was tested in the southern part of the Atlantic by Tel Aviv and Pretoria in the fall of 1979.

Pretoria is also actively at work to create nuclear weapons. Judging from foreign reports, there is an entire atomic complex operating in the Republic of South Africa. The South African press has given the name "nuclear-missile triangle" to the area between Cape Town, Cape Agulhas, and Mossel Bay. The press states that the Pretoria regime has allocated several billion rands for the construction of nuclear plants, testing grounds, research centers, and plants for the production of missile fuel in that region. According to the Cape Town newspaper ARGUS, a powerful military nuclear center has been extablished near the city of Mossel Bay.

In another area of the triangle, near Cape Agulhas, the state corporation for the development of weapons production is building a huge testing ground. A plant for the production of nuclear fuel has been placed into operation in the vicinity of Wellington. A secret research center operates at Faure where carefully selected scientists, engineers, and technicians work of problems of nuclear physics and chemistry.

The nuclear projects of the racist Republic of South Africa are carried out in close interaction with Zionist Israel. "The Republic of South Africa," the aforementioned SUNDAY TIMES noted with respect to the explosion in the southern part of the Atlantic, "could not have exploded a nuclear device on its own." The "Israel-Republic of South Africa" nuclear tandem is becoming more and more threatening. In exchange for South African uranium, Tel Aviv is helping the South African racists not only with technology, but also with the creation of the means of delivering the nuclear weapons. These are facts cited in foreign publications.

The Republic of South Africa has officially stated that its Army already has the 155-mm self-propelled howitzer, which is capable of firing projectiles containing nuclear charges. According to certain evidence, these projectiles were developed jointly by Tel Aviv and Pretoria. Since 1981 Israeli technical specialists have participated in the construction of the first nuclear-powered submarine in the Republic of South Africa. The two nations are working jointly on the creation of a cruise missile with a nuclear warhead. According to the plans of the authors of this omminous project, it will have a range making it possible to keep the entire African Continent, from north to south, in its nuclear sight, and furthermore, to threaten the nations of Asia from Israeli territory.

Washington is also taking part in the implementation of the dangerous plans. Information from the American Atomic Energy Commission indicated that 88 specialists have been trained overseas in this field. The USA has shipped nuclear reactors to Pretoria and sent more than 100 kg of enriched uranium to the atomic center at Pelindab. An agreement between the nations on deliveries of this uranium will be in effect to the year 2007. The Republic of South Africa also has its own plant for enriching this strategic material.

The foreign experts have calculated that in 1979 the Republic of South Africa had enough enriched uranium to produce seven or eight atomic bombs. The "nuclear appetites" of the racists are growing, however. In August of 1983 the American AP agency reported on plans by authorities in the Republic of South Africa to create yet another atomic center. It will be located in Cape Province, and 300 specialists will be employed there.

One understands the terrible threat posed to the peoples of the young liberated nations of Asia and Africa by the programs for creating nuclear weapons of the pro-American regime in Pakistan, Zionist Israel, and the racist Republic of South Africa, which are being effected with the connivance of the West and sometimes with its direct assistance -- particularly when one considers the fact that the vast majority of armed conflicts occuring in the 40 years since the end of World War II have occurred precisely in Asia and Africa.

Problems of nuclear weapons limitation, reduction, and nonproliferation have priority in the Soviet State's foreign policy course.

Our nation's position is clear and noble: restrain the arms race in all its directions, withdraw from the atomic abyss, and set out on a path leading to the banning and the elimination of nuclear weapons. Large-scale Soviet peace initiatives aimed at this, which were put forward by Comrade M.S. Gorbachev during his recent visit to France, offer an opportunity for deliverance from the threat of catastrophe.

The Nuclear Nonproliferation Treaty, which took effect in 1970, has an important place. Among other things, this was discussed in Geneva at a conference of states participating in the Nuclear Nonproliferation Treaty in August and September of 1985.

"...We are for vigorous efforts to restrain the arms race in all its directions," Comrade M.S. Gorbachev stressed. "And measures to prevent the spread of nuclear weapons unquestionably continue to occupy an important place here." True to its commitments, the Soviet Union has done and will continue to do everything within its power not just to prevent the spread of nuclear weapons, but also to halt and reverse the nuclear arms race, to drastically reduce and then eliminate the lethal arsenals.

/9365
CSO: 5100/11

URANIUM OFFER GREATER THAN DEMAND ABROAD

Lisbon O JORNAL in Portuguese 14 Mar 86 p 19

[Text] Portugal is the only country in the European Community producing uranium exclusively for export or reserve, for future use, at a time when the supply of this ore exceeds the demand by nearly 20 percent.

The national production of uranium, which amounted to 140 tons in 1985, representing over 650,000 contos from the standpoint of value, could double by the end of the century, if a new mining project, the economic feasibility study of which, made by ENU (National Uranium Enterprise),is nearly completed, receives approval.

Portugal, which ranks among the four countries of the European Economic Community with uranium resources, is meanwhile faced with the situation of raising its production under adverse conditions on the international market, specifically, surplus supplies caused by the competition from countries such as Australia and Canada, with surplus stocks that will ensure several years of consumption, and the resultant drop in the price of the ore.

In the context of its affiliation with the EEC, Portugal, which is now exporting part of its uranium production to the United States and France, will have to procure authorization from the European Commission to export the ore to countries that are not members of the community, under the terms of provisions in the treaty establishing the European Atomic Energy Community (Euratom).

At a time when the ore was in short supply on the international market and the prospects for using nuclear energy were more optimistic, Euratom required that the reserves of the member nations must be used by EEC countries.

The national uranium reserves have been assessed at 6,700 tons, at prices less than $80.00 per kilogram, and at 1,500 tons, at prices between $80.00 and $130.00; while the additional resources are estimated at 2,500 tons, and the speculative resources, at between 7,000 and 8,000 tons.

The national energy plan for 1984 called for a maximum installed nuclear power of nearly 3,000 megawatts, by the year 2010; which would ensure a contribution of nuclear power for electricity production of approximately 32 percent.

In 1983, oil accounted for nearly 81 percent of all the primary energy consumed in Portugal, and was responsible for almost 62 percent of the deficit in the balance of goods.

Of the EEC member nations, only Belgium, the Federal Republic of Germany, France, Portugal, and Spain produce uranium; and it is anticipated that, in 1990, the EEC will still have to import 75 percent of the uranium that it consumes.

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23 APRIL 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

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23 APRIL 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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CANADA

AECL RESEARCH PROGRAM FOR NUCLEAR WASTE DISCUSSED

Toronto THE TORONTO STAR in English 13 Mar 86 p A5

[Article by Robert McDonald]

[Text]

LONDON — Canada is one of the countries Britain should look to in planning future radioactive-waste disposal, according to a new report that calls the Irish Sea the most radioactive stretch of water in the world.

Current U.K. nuclear waste practices are amateurish, haphazard and ad hoc, says the report released yesterday by the parliamentary Select Committee on the Environment.

It questioned the need for spent-fuel reprocessing carried out at such facilities as the British Nuclear Fuels plant at Sellafield in northwest England.

Discharges from Sellafield have caused radioactive contamination in fish found as far away as the Swedish coast, the report said.

Five accidents have been reported at Sellafield so far this year. In one, nearly half a tonne of uranium was accidentally dumped into the Irish Sea. In another, a radioactive mist escaped from the plant, contaminating 15 workers.

The report notes that Canada, the United States, Sweden and Germany, which have not opted for the reprocessing route, all have well-advanced research programs for the development of storage and disposal facilities for nuclear waste.

Atomic Energy Canada Ltd. (AECL) has carved out a giant research laboratory 285 metres underground at Lac du Bonnet, Man., to test the feasibility of using granite formations as spent-fuel repositories, the report says.

The AECL lab, which is scheduled for completion this year, will test what effect drilling the cavern has had on surrounding rocks and groundwater that might carry radioactivity back to the surface.

It will also be used for experiments on the effect of heat and pressure on fractured rock.

The AECL facility will be available for co-operative use by other countries, the report notes.

/9274
CSO: 5120/32

KOZLODUY NUCLEAR PLANT CONSTRUCTION REPORTED

AU120828 Sofia BTA in English 0745 GMT 12 Mar 86

[Text] Sofia, March 12 (BTA)--The fifth generating unit of the first Bulgarian nuclear power station near the town of Kozloduy is under intensive construction. Forthcoming are the overall test of the process low diagrams and the test turning of the turbine with the steam from the operating capacities. Actually this would mark the beginning of the starting work which will leave to be completed this year.

The construction of a 1,000 MW reactor marked the beginning of a qualitatively new stage in the development of Bulgaria's nuclear power generation. These reactors have been considerably improved and meet higher technical requirements for seismic stability. Their construction has been industrialized with the introduction of new technologies. For these and for a number of other reasons the experience of the Soviet specialists of the Saporozhye and the Balakovo nuclear power stations who designed this generating unit, is of great importance. Let us recall that Bulgaria is the first country in the Balkans in which a 1,000 MW reactor is under construction.

A joint Bulgaro-Soviet group of specialists has been assigned the installation of the computer equipment. The fifth reactor will be fully automated. Polish and Vietnamese workers and specialists are also working on the site.

The sixth generating unit, which will also be of a 1,000 MW one, is under construction nearby. In 1988 half of the electricity generated in Bulgaria will be of nuclear origin.

/12858
CSO: 5100/3031

ANALYSIS OF SAFEGUARD SYSTEMS OF VVER-440 REACTORS

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian Nos 10, 11, 12, 1985 pp 434-438

[Article by Sandor Czakoi, science assistant fellow, VEIKI [Planning and Engineering Enterprise of Electric Power Plants; Elod Hollo, science chief fellow, VEIKI; and Zoltan Kovacs, science fellow, VUPEK [expansion unknown; possibly the Czechoslovakian equivalent of VEIKI]: "Reliability Calculations of Nuclear Power Plant Systems, Analysis of the Safety Protection Systems of Type IV VVEER-.440 Reactors"]

[Excerpts] 1. Goal and Basic Concepts

Before the startup and during the operation of nuclear power plants the reliability of safety protection systems of the reactors is evaluated and analyzed also by numerical calculations. The results of the analyses are used to locate the weak points of the protection systems, optimize the maintenance and testing strategies, compare the reliabilities of systems with different structures, and evaluate the risks deriving from the operation of nuclear power plants.

We also designated these as goals when analyzing the safety protection systems of the V-213 and V-230 reactor types of the VVER-440 blocks. In the present article based on the calculations performed we compare the reliability of the different structures of first-degree safety protection systems (BV-1) of the two reactor types. In introduction we will define a few of the basic concepts of technology and calculation, then describe the structural differences of the two protection systems, and finally evaluate the results obtained. We used the CAT/PREP/KITT program system for the calculations, and published the descriptions of these in the first part of our article.

According to the recommendations of the International Electrotechnical Commission (IEC) the probability of faults developing in that portion of the BV system which performs the emergency shutdown by the reactor's parameters should not be greater than the 10^{-5} value from the viewpoint of a dangerous fault's development. In our case this value can be achieved in both BV-1 systems by correctly selecting the time intervals of evaluation. We will observe here that in determining the necessary time intervals of evaluation the controlling factor is the probability of a fault developing in the least reliable configuration. It can be seen from our results that in this respect at both BV-1 systems the two-parameter configuration must be used as the base.

In the case of the BV-1 system of the V-213 reactor 900 hours of evaluation time interval is necessary to achieve the 10^{-5} value of fault development probability--if we perform the previously recommended changes in the exit channel. If we do not, we must expect a 720-hour time interval between evaluations.

In the case of the V-230 reactor 80-hour evaluation time intervals are needed to observe the IEC recommendation, which is difficult to accomplish during the course of operation. If the recommended changes are made the evaluation time interval may be increased to 720 hours.

Table 1. Types of Elementary Faults and Their Effects on the System

	A. Type of Elementary Fault B. Effect on the Systems		Fault development frequency
Unit name	Dangerous fault development	Danger-free fault development	x 10^{6}/hour
1. Relay, contacts of the magnetic switch	A. contacts stick together B. None	A. breakage, oxidation of contacts B. Yes	1
2. Relay, coils of the magnetic switch	A. -- B. None	A. Open circuit, short circuit B. Yes	1
3. Resistance	A. -- B. None	A. Open circuit B. Yes	1
4. Measurement channel	A. Dangerous B. Yes	A. Danger-free breakdown B. Yes	15.5
5. BR* block	A. Dangerous B. Yes	A. Danger-free breakdown B. Yes	1.3
6. Diode	A. -- B. None	A. short circuit B. Yes	1

*V-213 reactor type only

5. Summary

The following may be concluded on the basis of the results of the analyses performed:

--the configurations of the V-213 reactor type's BV-1 system are more reliable than those of the V-230 reactor type,

—we can improve the reliability of the BV-1 system of the V-230 reactor type by increasing the number of the measurement channels per parameter (from 3 to 6) and by doubling the exit relays of the logics channels. At the same time these changes will decrease the probabilities of breakdowns and lengthen the necessary evaluation time intervals,

—concerning the end channel of the BV-1 system of the V-213 reactor type, fault combinations consisting of two elements can occur which can be eliminated by removing the relays located in the end channel and thus the system's reliability can be significantly increased. The end channel of the V-230 reactor's BV-1 system is not among the "weak points" of safety protection.

8584/9365
CSO: 5100/3024

DESCRIPTION OF WATER TREATMENT SYSTEM OF PAKS NUCLEAR POWER PLANT

Budapest ENERGIA ES ATOMTECHNIKA in Hungarian Nos 10, 11, 12, 1985 pp 440-446

[Article by Peter Tilky (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise), Arpad Doma (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise), and Tamas Pinter (dipl. chemical engineer, Paks Nuclear Power Plant Enterprise): "Description of the Water Treatment System of the Paks Nuclear Reactor"]

[Excerpts] Four type VVER[1]-440 nuclear power blocks will be built on the premises of the Paks Nuclear Power Plant. The blocks each have a performance of 440 MW, and light water is used to carry heat in their primary circuits as well as their moderator.[2]

Performance regulation of the reactors and control of the excess reactivity are accomplished with boron-steel regulator rods which can be placed in various positions in the active zone and by changing the concentration of boric acid solution dissolved in the heat carrier of the primary circuit, because the B atoms have good neutron adsorption characteristics. In the interest of the nuclear reactor's operating and radiation safety and of keeping the rate of corrosion of the structural materials to minimum and steady values, the heat carrier of the primary circuit must perform to the following strict standards.

In the secondary circuit a water function must be maintained which also satisfies the requirements of the large surfaces of the carbon-steel equipment and of the steam generating materials made of austenitic steel. Most suitable for this purpose is to purify the full main stream by condensation and combine it with feed water which is conditioned with 20-60 micrograms of hydrazine per kilogram of water.

1. Water Standards

1.1 Primary circuit water standards

a) H_3BO_3 concentration: 0-8 g/dm^3

--boric acid concentration of about 8 g/dm^3 after changeover, practically 0 before changeover

--12 g/dm^3 during the time of changeover of the active zone, and for reactors during shutdown.

b) pH: 6 in the interest of minimizing the rate of corrosion

c) K^+ concentration: 2-16.5 mg/dm^3

--the K^+ concentration is a function of the actual boric acid concentration,

--the pH-increasing effect of the small amount of Li^+ and Na^+ ions present in the primary circuit must also be taken into consideration in establishing the K^+ concentration.

d) Dissolved oxygen concentration: 0.01 mg/dm^3

--this value can be maintained by the thermal and chemical degasification of the makeup water and by holding down the radiolytic decomposition of the water in the primary circuit.

e) Dissolved hydrogen concentration: 30-60 Ncm^3/dm^3

--the dissolved H_2 decreases the equilibrium 0 concentration of the water's radiolysis.

f) NH_3 concentration: 5 mg/dm^3

--the necessary amount of H mentioned above comes from the radiolytic decomposition of the NH_3

g) Cl^- concentration: 0.1 mg/dm^3

--maintaining this parameter is designated to prevent the intercrystalline corrosion of the austenitic steels of the primary circuit

h) Calculating the corrosion products in terms of Fe equivalents:

1.2 Feed water standards of the Secondary Circuit

a) conductivity: 0.3 micronS/cm
b) pH: 7.5-8.5
c) chloride ion concentration: 20 micrograms/dm^3
d) silicates (SiO_3^{3-}): 25 micrograms/dm^3
e) oxygen concentration: 10 micrograms/dm^3
f) iron corrosion products: 20 micrograms/dm^3
g) copper corrosion products: 3 micrograms/dm^3
h) hydrazine concentration: 20-60 micrograms/dm^3

To purify the main condensate a condensate purification system was built for each turbine with chemical feed systems to accomplish the conditioning.

Summary

In their numbers as well as by their functions, the water treament systems of the Paks Nuclear Power Plant provide purification of the various aqueous media during the power plant's operation. They also contain adequate reserves for extraordinary situations. Through their coordinated manner of operation the nuclear power plant's radiation safety can be advantageously influenced, and corrosion damage of the structural materials can be held to a minimum level.

There are a number of possibilities to optimize the water treatment systems of the Paks Nuclear Power Plant mainly by refining their methods of operation. Extensive research and operational tests are underway to accomplish these. The goal of these is to achieve minimal waste production and the most favorable radiation conditions. In this respect the Paks Nuclear Power Plant occupies a good position in international comparison. It is our desire to publish in the near future the results achieved in this topic.

FOOTNOTES

1. VVER: water-water energetics and reactor.

2. Moderator: the medium serving to slow down fast neutrons to thermal neutrons.

8584/9365
CSO: 5100/3024

JUSTIFICATION FOR NUCLEAR PLANT DEVELOPMENT QUESTIONED

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 8-10 Mar 86 p 2

[Article by Radmila Jovanovic: "Compromise Got Ahead of the Economy"]

[Text] As we come closer to April, when the international competition expires for construction and selection of the fuel cycle for four nuclear power plants each with a capacity of 1,000 megawatts in Yugoslavia, a public stirred up by the opposed opinions of the experts is increasingly restless. If we exclude fear, which gives everyone the right to say what he thinks regardless of arguments, then everything comes down to the point that nuclear power plants in Yugoslavia's very near future represent a compromise because of resistance to the economic valuation of domestic sources of energy, to their optimum consumption, and to a crash effort to develop what is available in order to repay the excessively heavy foreign debts as soon as possible and without the nuclear power plants. The sequence followed by adoption of the nuclear program is very symptomatic.

Decisions were being made concerning nuclear power plants in Yugoslavia back some three years ago when the Strategy for the Long-Range Development of the Fuel and Power Industry was deliberated and adopted as an integral part of the stabilization program. Nuclear power plants were included in the strategy as something inevitable for Yugoslavia, especially after the year 2000. Advertisement of the international invitation for bids on their construction and selection of the fuel cycle is only one of the steps which have followed after verification of the strategy by the highest sociopolitical and government bodies in the country.

Reserves of Coal - On the Rise!

The desire for a way out of the long lines of scarcity and inclusion in that Europe and that world which have not even given them a thought for a long period of time did not even let the voices opposed to the nuclear power plants get through. Nor did the conferences, seminars and series of lectures by specialists in which they talked about resources and capabilities of domestic conventional sources of energy and their advantages over nuclear power plants help until the invitation for bids was actually advertised. Not even decisions of the Croatian Parliament and the Slovenian Parliament on construction and choice of a site for a new nuclear power plant, the second in the country, were able to arouse public opinion and the competent authorities.

Only now are we hearing from those whose professional and political duties put them in a position to read both the strategy and the stabilization program, andin fact they even participated in their adoption and enactment. Ordinary citizens are on the side of those who are concerned about their own existence and that of their progeny. All of this contributes to the argument that the nuclear program-- which in the way it was conceived can serve as a good example of how all technologically sensitive issues should be regulated in a uniform way for the entire country -- was deliberately enclosed in the wrapper of the Stabilization Program and the Strategy so that it would pass through more easily.

No one in the world, not even anyone in our country, has refuted the argument that nuclear power plants are a destiny which countries which have scant sources of energy will not be able to avoid. And that will be the case until some new universal form or source of renewable energy is found with a smaller potential hazard and uncertainty for future generations. The question is whether Yugoslavia is really among those with scant sources of energy and whether it should now and in this way catch what is supposed to be the last nuclear train.

Yugoslavia's resources of petroleum and uranium are scant, but not its water resources and known coal reserves. Those reserves are concentrated in Bosnia-Hercegovina and Serbia and are estimated at about 22 billion tons. The caloric value is between 1.887 in Kosovo and 3.037 in Bosnia-Hercegovina. For that reason it is not suitable for long-distance transport, which makes it indispensable that those who need the power generated from coal invest jointly to build facilities for it to be consumed within those republics. That is roughly the one side of the coin. The other lies in the fact that power has not been given an economic price, and its largest producers (who generate it from coal) sell it within the country at their own price, which is lower than the price at which it is consumed elsewhere.

It is not difficult for Croatia and Slovenia to reach agreement on the model of a joint investment to build the "Krsko" NE, to really refine that model and for the new nuclear power plant, and at present to do really everything to upgrade their electric power industries. Nevertheless they are up to their ears in losses, precisely because of those power plants. Still, in the country at large there is no uniform model of investment in joint power plants nor for the price of the electric power they generate. Yet there is enough coal for the production of power planned over at least the next 100 years. Its reserves are growing steadily thanks to exploration at newly discovered locations like the Cacak and Pester locations in Serbia.

With What Goods are the Nuclear Power Plants to be Paid For

The hydropower potential should also be borne in mind. But it turned out to be easier to agree on borrowing money jointly abroad and on repayment of debts denominated in foreign exchange which give employment and development to the foreign partners than concerning the use and development of domestic forces.

One of the basic arguments of those who favor continuous building of nuclear power plants beginning at this very moment is that this is supposedly the last chance to jump on the nuclear train and become part of the technological revolution. The point is well taken that nuclear technology does raise the quality and upgrade all other technology and equip domestic industry for manufacturing to the highest standards, as it has been put by Dr Naim Afgan, professor in the School of Mechanical Engineering of Zagreb University, and Dr Milovan Studovic, docent for construction of nuclear reactors in the School of Electrical Engineering Belgrade University. Other specialists at the same level of knowledge and experience, like Dr Milorad Ristic, until recently professor of nuclear reactor construction at the School of Mechanical Engineering of Belgrade University, say that the Yugoslav machine building industry, which is disunited, is already too late for the nuclear program and that it has an opportunity to perfect itself and achieve supreme quality in other activities where it has more experience.

Yugoslav industry at one time mastered the production of thermal electric power plants with a capacity of 100 megawatts and was well on the way to equipping itself even for the largest ones. It has been five years or more now that the machine building industry in Croatia and Serbia has been unable to agree on the building of a factory to make boilers for coal-fired power plants with a capacity of 200 megawatts, while in Yugoslavia plants with a capacity of 600 megawatts are already being built on a large scale. The level of quality we want to achieve in nuclear technology, which is so sensitive, is also decisive to the construction of those plants. All interested parties know that those who possess nuclear technology are not about to allow anyone outside the blocs to get into the "fuel cycle." Put more simply, the vital equipment is kept secret, and the work that is given out is the conventional technology which is practically identical to that of thermal electric power plants.

Nuclear power plants have an advantage over thermal plants because they are clean, they consume less fuel, and they are built where the power is consumed and are not dependent upon location of the source of energy. As a rule the thermal electric power plants, especially when it comes to the quality of Yugoslav coal to fire them, have to be built at the pithead, and many people say that transmission of the electric power from them over long distances is expensive. This is to ignore the fact that construction of the network of a higher voltage would be gradual, that Yugoslav industry would be built up, as would most of those thermal electric power plants, and that the foreign exchange borrowed for all this would remain at home.

A single nuclear power plant with a capacity of 1,000 megawatts costs about two billion dollars (with interest) for advanced and stable economies. Drago Tomsic, M.A., an economist at the "Milan Vidmar" Electrical Institute in Ljubljana, says that importing a single facility from the convertible market and paid for with export goods costs at least two-and-a-half-fold more because of interest, rescheduling debts and low export prices. He calculated that to pay off a single project from the convertible market the workers in the West have to work one year, while in our country they work about seven years because of interest, low productivity and the export prices on our goods!

No one has so far computed how much it would cost in foreign exchange to build four nuclear power plants in which domestic industry would participate nor what quantity of new goods and in what plants would have to be produced in order to pay them off. The present capacity and the unused potential it contains are not sufficient unless there is large-scale reorganization and restructuring even to pay off the debts we have contracted so far. So, the construction of nuclear power plants should not be looked at in the light of the potential hazard to the human environment either, but from the standpoint of economics. A seat might be taken in the nuclear train and we might be part of its schedule only somewhere around 1995 or perhaps some later year, when Yugoslavia will have more economic strength and there will be greater justification from the energy standpoint to build nuclear power plants, but they would be of considerably more recent technological date than those at present.

7045
CSO: 5100/3027

ROUNDTABLE ON NUCLEAR POWER PLANT CONSTRUCTION

Zagreb VJESNIK in Serbo-Croatian 9, 16 Mar 86

[9 Mar 86 p 5]

[Interview with nuclear power specialists by Boris Petrovic and other VJESNIK staff writers, date and place not given]

[Text] Last week there were again quite a few reports from the outside world about certain bad experiences with nuclear power plants. Obviously, they no longer report on the sound operation of the other nuclear power plants. That is to some extent understandable from a journalist's viewpoint, since circulation wants fresh news. A similar line of thought led to reproaches of the news media these past days in a roundtable discussion devoted to our future energy situation, i.e., to the question of whether we are going to enter it with nuclear power construction projects or not, as well as reproaches of investors calling for them to provide additional and more complete information to the broadest public concerning their plans than they have up to now.

It was with the same aim that the editors of VJESNIK organized a roundtable discussion from which we published the first report last week, and now we are continuing it. To recall, the participants were Dr Naim Afgan, staff scientist in the "Boris Kidric" Nuclear Science Institute in Vinca; Dr Danilo Feretic, professor at the School of Electrical Engineering of Zagreb University; Ivan Medvedec and Dr Zeljko Pavlovic of the "Krsko" Nuclear Power Plant; Dr Djuro Miljanic, senior scientific associate of the "Rudjer Boskovic" Institute in Zagreb; Milan Novak, engineer and assistant chairman of the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades; and Zarko Petrovic, engineer and coordinator of the working group of the "Prevlaka" Nuclear Electric Power Plant in the Croatian Electric Power Community.

Whereas in our last issue we concerned ourselves with the possible causes of fear of nuclear power plants and explanations as to whether they are as necessary to us as is alleged, we are now publishing a part of the conversation concerning some of the consequences of their operation, our ability to take over nuclear technology, and the most recent world news in this area.

A Fateful, But Not Provocative Topic

VJESNIK: The fear of radiation is often in first place among the numerous reasons why such power plants, as their opponents say, should be eliminated.

Danilo Feretic: As far as the impact on the environment goes, at the present time it is generally accepted that nuclear power plants are a better solution than conventional thermal electric power plants, for instance those fired with coal. I would also add that at the upcoming conference being organized by the International Agency for Atomic Energy one of the topics discussed will be construction of nuclear power plants on behalf of environmental protection! But regardless of this topic, which until recently was quite provocative, it is enough to compare the environment of the "Krsko" NE with the environment of any thermal electric power plant.

As for the fear of radiation, I would recall the datum that the annual radiation dose of a person living in the immediate vicinity of a nuclear power plant is less than 3 millirems. Every year a man is irradiated with a dose of about 10 millirems from looking at color television. There are several other comparisons that might be referred to, but I think that that is enough said. It is also a fact that the 38 reactor years of operation of nuclear power plants in the world have not as far as we know resulted in a single breakdown in a nuclear plant that would have resulted in a case of death. There is hardly any branch of the energy industry that can boast of such a figure, not to mention the accidents in mines.

When the discussion turns to the safety of nuclear power plants, mention is immediately made of the well-known incident recorded in 1979 at the Three-Mile-Island Nuclear Power Plant. That is the largest incident that has occurred so far in any such power plant, but still even the individual who was irradiated most intensely received a dose less than that from a single X-ray.

VJESNIK: Safety also depends on making proper repairs, on maintenance, on the training of personnel....

Ivan Medvedec: In the repairs done so far there have been three or four foreign experts participating. We are doing everything with our own resources, but the job is done in conformity with the strictest standards.

Zeljko Pavlovic: The personnel employed at the "Krsko" NE were especially trained for their job, and there is a constant practice of "retraining" through which all specialists go even though they have masters' degrees, doctors' degrees, and so on. I might also enumerate many other measures which reduce the risk because of the "human factor" to the level which is customary in the world, that is, a very low level.

Djuro Miljanic: The International Atomic Agency in Vienna, which has an important role in assisting countries with nuclear power plants to adopt appropriate legal regulations, also organizes what are called safety missions, visits to nuclear power plants, and in so doing it gives its opinion on the condition of the facility, the level of training and performance of personnel, and so on. So far it has been satisfied with what it saw at Krsko.

Zeljko Pavlovic: We have been given higher grades than the average recorded at other nuclear power plants. I would also add that four- to fivefold more specialists with higher education are employed at the "Krsko" NE than at similar facilities in other countries. Incidentally, a special "hot line" with direct connection to Westinghouse has even been installed in case of a trouble we could not solve ourselves.

VJESNIK: Has it been used yet?

Zeljko Pavlovic: Only during the drill which included all procedures in case of a serious accident.

VJESNIK: Which means that this is also taken into account. Otherwise why would there be drills?...

Naim Afgan: You are familiar with Murphy's law, which states: "If something can happen, then it will happen."

VJESNIK: We also know the extension of it: If it did in fact happen, there was always someone who knew that it would happen!

Naim Afgan: Well, let us say quite seriously that regardless of whether any such large accident has ever been recorded, preparations should be made for every possibility. But great concern should be paid to safety even in the stages of design and construction. You know, nuclear technology was unable to indulge in the luxury of operating on the principle of trial and error like numerous other industries. That is why a multiple barrier is set up between the radioactive substances and the outside world and why there are other automatic safety devices.

Danilo Feretic: I would also add something about the radiation many people are so afraid of. After all, we hear things like this: If, say, the permissible dose in some case is less than 150 millirems, what will happen if a person receives 151 millirems? Will he suffer? In general, the question of radiation is not well known, and a lot of time and newspaper space should be devoted to clarifying matters. And to show that matters are not really so serious as some people say, in addition to the figures which I have already given, I will add that it is less well known that inhabitants of parts of Slovenia, for example, Jesenice or Kranjska Gora, receive approximately 100 millirems a year more than inhabitants of the Sava Valley. Dare we immediately conclude on that basis that that region is unhealthy?

VJESNIK: How capable are we of adopting an entire series of nuclear power plants?

Danilo Feretic: Over the period of time since we were starting out with the "Krsko" NE there has been quite a bit of change for the better. We know quite a bit more than we did, we are more expert in evaluating technology, some 40 nuclear engineers have completed their studies, and their advanced technical training is still continuing. We should also mention the competence of republic inspectors and other related agencies.

VJESNIK: The "nuclear people" are attacked for building yet another power plant on an unregulated river.

Ivan Medvedec: My answer to that is that during a low-level flight over the Tennessee River I saw that it has not been regulated over its entire course, and still several nuclear power plants have sprung up on its banks. The two which I visited had capacities of 3,900 and 2,600 megawatts. So, they are many times more powerful than the "Krsko" NE, but still they are cooled with water from an "unregulated" river.

VJESNIK: There are obviously a host of opinions or at least assertions and assumptions which should be taken into account and reconciled with one another, and that also applies to the question of the degree of regulation of a stream where a nuclear power plant has been built. However, there is one thing that all nevertheless agree on, at least as far as our country is concerned: the power from the nuclear power plant is too expensive when all the construction costs, the interest, and so on, are added together.

Ivan Medvedec: Depending on the version of the computation; that is, with capital formation or reduction to zero [?] we will get a price per kilowatt-hour generated which at the very least will be competitive with other power plants.

Danilo Feretic: According to the most recent figures, and I will refer to only three examples, the electric power obtained from nuclear plants actually turns out to be appreciably cheaper than what is obtained from conventional thermal electric power plants. In France, if we take the power from thermal power plants fired with liquid fuels as 100, power plants which use coal (together with the device to remove the sulfur) produce it at a price index of 46, thermal power plants without removal of the sulfur at 42, and nuclear power plants at 31 percent of the price per kilowatt-hour from the "oil-fired power plant." In Belgium electric power coming from the "Chooz B" NE costs 52 percent of the price of power from the oil-fired thermal electric power plant, and so on. In Japan the price is even compared to that of hydropower. If the price from a hydroplant is taken at 100 percent, then power from a coal plant costs 75 percent and that from a nuclear power plant 60 percent. Those are all prices whose absolute level needs special comment concerning the specific energy conditions of each country.

VJESNIK: What kind of nuclear power plant do you think the electric power industry will decide on? The most recent model or that which has so far been operating satisfactorily the longest?

Danilo Feretic: In such matters the electric power industry pretty much tends to play it safe, and that also applies to choosing equipment for a conventional power plant. The features usually accepted for nuclear power plants are those which certainly offer the most good experience. Unfortunately, the development of technology is sometimes faster than analysis of experiences that would help to make a decision. That is why the trend in the world today is toward standardization of certain components of nuclear power plants and at the same time toward construction of power plants with smaller capacity, i.e., some 500-600 megawatts. The trend is toward buying the smallest and most standard model. If you want the most recent model, pull out your wallet and pay for something that might turn out to be nothing more than an experiment.

VJESNIK: What is the news in the field of nuclear power plants which has not been recorded by the domestic news media?

Djuro Miljanovic: Among the items which have not been published in our country and are mainly known to the restricted group of specialists I would single out the following. In December 1985 the prime ministers of the member countries of CEMA agreed on a joint comprehensive program for development along the five most important directions, among them nuclear power. Their main aims in that area are to perfect and continue construction of power plants with light-water reactors, improvement in the handling of radioactive waste and its disposal, development of combined nuclear power plants and heating plants, and the development and construction of fast-breeder reactors and research on controlled fusion.

South Korea has invited bids for construction of its 11th and 12th nuclear power plants, in India a proposal has been made to build another 14 in addition to the 6 they have now, and construction is supposed to begin before 1990. Incidentally, in January the "Superphoenix," the most powerful fast-breeder reactor in the world (1,200 megawatts), went on line in France, and it is anticipated that in the decades immediately ahead power plants with those reactors will have an important role in the electric power industry.

Dr Josip Cicek: Nothing Gets Built With Labels

So far the greatest contribution to organized resolution of the hesitation about building nuclear power plants has been made by the Section of the Croation Republic Conference of the SAWP for Environmental Protection and Improvement and its chairman, Dr Josip Cicek, hardly needs a special introduction. That is why we will skip the usual introductions and move on to the questions we had hoped to put to him at our roundtable discussion, which unfortunately he was unable to attend.

[Question] Right at the beginning we are interested in knowing whether as an individual and a physician you are an opponent of nuclear power plants?

[Answer] I am not an opponent of nuclear technology and nuclear power plants. I am aware that medicine--if one talks only about ionizing radiation--puts a considerably higher burden of all sorts of radiation on modern man with its diagnostic and therapeutic methods than do nuclear power plants. As an individual and on the basis of everything I have seen in 11 countries where there are nuclear power plants and conversations with specialists in the nuclear and health fields, I can say that nuclear power plants do not represent a danger in an organized society and in normal operation.

Of course, I put my questions on all matters primarily as a physician and as a person concerned with the problems of environmental protection. But precisely for that reason I say that society must be organized in an almost militant way in order to prevent possible dangers and for effective protection of the environment. We need a high level of techological awareness and sophistication as well as ecological awareness. Otherwise, nuclear power plants represent a great potential danger.

In view of the location of the present nuclear power plants, the long-term consequences of their operation, and also the kind of "consequences" that have already been recorded in the world, our low level of organization, and above all the catastrophic situation in the practical matter of environmental protection, I must admit that I am deeply disturbed. In spite of all the reports about incidents, I say that actually little is known about all this. For example, it is not very well known that beyond the Urals there is an area, approximately half as large as Yugoslavia, "surrounded by barbed wire" for the next 24,600 years, and all of this because of nuclear troubles. I am also worried because we have more than 300 laws, regulations, and so on, pertaining to environmental protection, but presumably there is no need to spell out what actual performance has been. And something else. We have actually been systematic in failing to resolve the question of financing environmental protection.

Four Years of "Pruning"

[Question] As chairman of the section for environmental protection, you say that in the section you have not attacked the nuclear program?

[Answer] We have. Both as a section and as individuals responsible for being concerned in an organized way about protection of the environment. But not out of any sort of "emotions" as we have been accused of, but because of the bad experiences there have been so far in the application of that technology. It has to be said openly and honestly that at the time when our first nuclear power plant was under construction we did not have any legislation at all in this area, and the builders had to "push" the administrative agencies to adopt appropriate laws and thus put in place the conditions for construction and operation of the "Krsko" NE. Isn't this indication enough of our situation? Quite a bit has been done so far, but is all of that sufficient for us to be reflecting even about a series of nuclear power plants?

[Question] Every month your section receives a report on the operation of the "Krsko" NE, and its general conclusion has been that it is operating well.

[Answer] Very good results have indeed been achieved in these 4 years, but the state of concern still persists. I will mention just one example, and that is the problem of monitoring, that is, of monitoring the impact of the nuclear power plant on the environment. Monitoring is actually one of the essential conditions for the "operating permit" of a nuclear power plant. Under republic and federal legislation the monitoring must be provided and done by the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades. The scope of that monitoring has been "pruned" for 4 years now, and there has been a tug-of-war over extending the contract on conducting it. When the nuclear power plant "felt" a certain insecurity, a decision was made by the bodies of management not to pay any longer for that portion of monitoring which pertains to nonradiological emissions. Then there were interventions, and everything somehow quieted down. And now we have a unilateral decision by the chairman of that committee that they no longer have to pay for that. The legislation provides otherwise. Unless we manage to peacefully agree on a resolution to that dispute, we must as citizens institute judicial proceedings against the committee and its chairman!

[Question] Have there been other objections as well?

[Answer] There have been things which simply horrify me as an ordinary citizen and as a member of the section! I might read a long list, but I will single out one example. At first the nuclear power plant was supposed to emit into the Sava radionuclides with a value of 1 curie, and then the limit was moved up to 2....

[Question] Is that already hazardous?

[Answer] That is not the point. Ultimately even 10 curies is not hazardous, but it is well known that the radiological capacity of the Sava is 10 curies, so that at the upper limit that was fixed in the first version on the river there would be, as it were, "room" for 10 nuclear power plants. If we go on this way, the "Krsko" NE will take up the entire allowed capacity of the Sava for the discharge of radionuclides. What right do we have to do that? We will be asked questions about this by the other republics through which the Sava flows and with good reason, and coming generations will have to reflect on this, if they intend at all to build new nuclear power plants.

Why Is There Such Division?

[Question] What about the heat pollution, which was why the nuclear power plant had to operate at less than capacity or even stand idle when there was the greatest power shortage because of the drought? Does all this mean that reports on the operation or, better put, the consequences of operation of the "Krsko" NE have not really been so splendid as some people assert?

[Answer] At the moment the nuclear power plant is safe, just as it is said to be. But it cannot meet the idealized and high engineering and technological requirements which were announced at the outset. Are those conditions too strict by comparison with world practice? I think not, and I emphasize that guarantees were even offered that all the operating conditions established would be met. There have also been departures from the limits once established in the area of thermal pollution. Back in 1974, when our section and the Yugoslav Council for Environmental Protection organized the first public discussion of these topics in Zagreb, representatives of the electric power industry even laughed at our doubts about excessive heating up of the Sava! They said that the nuclear power plant would not raise the temperature more than 2° Celsius, but we now know that there have been cases when the Sava was heated up even more than 6° Celsius above what can be stated most simply as the normal.

It should also be said that this did not cause harmful consequences, since the heating up took place in the wintertime, but all of this is evidence that the promised limits on the nuclear power plant's environmental impact are gradually being exceeded.

[Question] Nevertheless, tell us why you and the section have somehow attacked construction of nuclear power plants?

[Answer] There are several reasons. Throughout the world nuclear power plants are mainly grouped at one place, i.e., several such power generating units are built on the same site, which has been verified. We obviously intend to scatter them over all of Yugoslavia, however it suits the individual power industry [that is, of the republics] or guided by individual and local interests. I think that a nuclear program cannot support that kind of behavior, and I have every reason to support that assertion from experience in the rest of the world. I will also add that the nuclear program we are talking about has in practice very few features of a national program, although the opposite is asserted.

The second of our numerous objections has to do with the fact that other solutions were not even offered for overcoming the energy crisis. They told us: either nuclear technology or darkness and disaster. It is especially disturbing that all the documents announce industrial development, the training of personnel, benefit to all of associated labor, and the like, but I have never seen mention anywhere of development of scientific institutions that would be concerned with the ecological aspect of applying that technology. That is how it is done everywhere in the world. That is probably how it will also be done in our country, but then at the expense of the entire society, not the "nuclear power people." That is intolerable, and all of those related activities ought to be developed and paid for by the investors in the nuclear program. I would also add that nowhere do the plans mention the additional infrastructure: for example, not even the special roads for carrying everything related to nuclear power plants. Is the fuel or the highly radioactive waste to be carried on the Zagreb--Rijeka highway in the middle of the tourist season?

Nothing Without a Dialogue

[Question] At the frequent meetings where there has been discussion of the future energy situation and nuclear power plants there have been quite a few serious reproaches of the electric power industry. They usually have to do with being late and incomplete in informing the public.

[Answer] For my part I reproach them for not having taken pains, for not having required their specialists to provide information on all the details that argue for or against nuclear power plants. There should be more complete and timely information provided on all aspects even to the so-called opponents of nuclear technology, and an open dialogue should be initiated.... In Sweden 5 years before the decision was made on such power plants the funds were provided for operation of numerous specialized institutions which prepared pamphlets and materials on nuclear technology. They were free to every citizen who wanted them. That generated a great deal of material in which completely opposing views were frequently argued, but every occasion was offered to learn as much as possible about this important area and the problems in it and to arrive at one's own position. The opportunity for choice was offered, and confidence in the specialists was preserved. And when a referendum was organized, it was possible to take a position after 5 years of discussion and hundreds of debates on radio and television....

An example of how the investor should behave can also be found in another country. France gave a great deal of reflection to preparing the broadest public for carrying out the nuclear program, and in Denmark, where it was not adopted, a nuclear package was offered to parliament in a first version, but without offering other solutions. The package was returned to sender. The investors were simply told that they should also propose other solutions, and then a decision would be made of what would be more favorable for the country in terms of energy and finance in view of its specific situation. Denmark also has extremely scant sources of energy of its own, but still it rejected the nuclear program. Advocates of alternative solutions proposed by the universities in Aarhus and Copenhagen and reliance on conventional power plants prevailed even though Denmark does not have large coal reserves or hydropower. And astounding results have been achieved using bioenergy, that is, by obtaining biogas and electric power from that source. I will only mention that I myself have had an opportunity to see how every farmer who has 200 cows produces enough gas to meet his own needs, sell the surplus to the government, or use it to produce electric power which he also sells! And Denmark, let us recall, is a country with a very high per capita electric power consumption.

Regardless of what the final decision would be, even before construction of the "Krsko" NE the broadest public should have been made familiar with all the details related to construction of nuclear power plants or any other power facility. Back in 1979 I prepared a publication on what science knows about the accompanying consequences of producing any type of energy. So far I have not found a publisher, although I offered the material and renounced any payment for it whatsoever. A book of that kind containing the most important data on nuclear power plants was exceedingly necessary, and proposals for publishing one were made even in the series of lectures recently devoted to this topic.

Put Simply: Protectors of the Environment

[Question] You and people who think like you are referred to as "green."...

[Answer] Up until the well-known statement in the LCY Central Committee I was exceedingly dissatisfied with the articles our newspapers published in which they wrote uncritically about nuclear technology and forgot about the ecological aspect, and when I began to publish a pamphlet which called attention to that side of the coin as well it was all of a sudden broken off, supposedly because of some intervention "from above."

When articles began to be published which did not support nuclear power plants then there began to be that kind of name-calling. We do not consider ourselves either "green" or "ecologists" at all, but simply protectors of the environment. But now I am considerably better satisfied about the work of the news media, since an occasion has finally been offered for what we might refer to as both sides expressing their opinion. It is just that all of that began with a lag of at least 5 or 6 years.

I would add that in our self-managed society everyone must be in favor of development, but also in favor of protection of the environment in which they themselves live and which they are leaving as an inheritance to future generations. In that context, and I in fact propose this as one of the topics for

VJESNIK's articles on nuclear power plants, there ought to be more serious concern with the question of storing nuclear waste and the reasons why several sociopolitical communities have already refused to have such waste disposal sites on their territory.

[16 Mar 86 p 6]

[Interview with specialists in nuclear technology by Damir Mikulicic and Boris Petrovic: "Nuclear Power Plants Under the Magnifying Glass"; date and place not given]

[Text] Hardly a day goes by in which there is no news from the outside world in the field of nuclear energy, and these new items (mainly bad for the "nukists") have been especially frequent since the prices of oil have been dropping. At the same time, as the deadline approaches for bids on construction of the nuclear power plants in our country, there have been more and more public statements by individuals opposing the use of nuclear power, the nuclear power plants have aroused vigorous exchanges in meetings, and the general public has been mostly confused. After all, many people rightly ask: Wasn't everything being said now known even earlier, even before construction of our first nuclear plant at Krsko?

Do we need nuclear power plants at all, or do there exist other less expensive and "less hazardous" solutions; why is there suddenly this virtual flood of distrust, who is it that is frightening us with the bugbear of radiation, and why; are nuclear power plants really as unreliable as some people assert?

These were also some of the questions taken up in the roundtable discussion organized by NEDELJNI VJESNIK; on this occasion the participants in the discussion were Dr Naim Afgan, scientific adviser in the "Boris Kidric" Institute for Nuclear Science at Vinca; Dr Danilo Feretic, professor in the School of Electrical Engineering at Zagreb University; Ivan Medvedec and Dr Zeljko Pavlovic of the "Krsko" Nuclear Power Plant; Dr Djuro Miljanic, senior scientific adviser at the "Rudjer Boskovic" Institute in Zagreb; Milan Novak, engineer and vice chairman of the Croatian Republic Committee for Energy, Industry, Mining, and Crafts and Trades; and Zarko Petrovic, engineer and coordinator of the working group for the "Prevlaka" Nuclear Electric Power Plant in the Croatian Electric Power Community.

Let us immediately add that the number of those who wanted to talk about this "hot" topic was considerably greater at the outset, but some withdrew at the last moment. Was the topic too hot?

Right at the outset we wanted to hear the opinion of our interviewees about why all of a sudden there is such a hue and cry in our country about nuclear power plants, why so much "fear" and lack of confidence in the professional competence of our scientists to evaluate whether we need nuclear power plants or not?

VJESNIK: What are the causes of this sudden fear, and has the rest of the world also become afraid of the nuclear power plants it has been living with for some 30 years?

Naim Afgan: It seems that we did not sufficiently take into account the "factor of the public." That should be said straight out. Concerned with our everyday affairs and the desire to obtain scientific results as soon as possible, we forgot about informing the broadest citizenry. Now others have entered that vacuum, and I agree with the opinion that the best conclusion can be drawn concerning the causes of the "fear" if we draw up a list of the people who are spreading it and analyze what it is that these people do for a living. Nevertheless, it is we professionals who are the most to blame for the disposition against nuclear power plants that has now been aroused.

Who is afraid of nuclear power plants, or at least who is coming out against them? I would say that there are roughly three groups of people: Most of those who are "frightened" do not have enough education, and their fear of the unknown is easy to understand. Incidentally, the same thing has happened in the rest of the world. Some sociologists compare this to the reactions and fears that prevail in certain primitive tribes. For example, certain tribes in Zaire have a panicky fear of lightning, sterility, and bronchitis. Why precisely those among all the other dangers? There is no rational explanation. The same sociologists say that in modern civilization people are most afraid of war, poverty, and unrest, but also of nuclear energy. Again there is no rational explanation as to why alongside the numerous other equally great dangers which potentially threaten us in everyday life.

I would put in the second group some of those who are professionals in related activities and want to extend their competence to nuclear energy as well. That is how very-well-known and prestigious names resound in the public; the ordinary man does not doubt their opinion at all, since he does not know that they are ignorant and incompetent when it comes to nuclear energy.

And finally, I would put in the third group those whose ultimate goals at this moment are not altogether clear, but they are skillfully taking advantage of the space left open to them. Among them there are even dissident groups, and it is strange that there have not been more severe reactions to the statements made by such individuals and groups. I feel that neither the electric power industry, nor the industrial sector, nor science have turned sufficiently toward the public. Had that not been the case, what you asked about would not have happened.

Danilo Feretic: I would say that there are only two groups: In one, the general populace which is not well enough informed, and in the other, those who have been attempting to manipulate it.

The work on the nuclear program in Yugoslavia actually began some 30 years ago, work has been going on in Vinca, Ljubljana, and elsewhere, and there has been no reaction whatsoever. But when the question was raised of the competitiveness of nuclear power with other sources of energy, a storm was raised. That also happened in the United States in the seventies when the coal and oil producers sounded the alarm. Fear of the unknown or the insufficiently known has been skillfully used everywhere for certain goals. I wonder why all of a sudden the "Braca Ribar" Local Community has gotten into an uproar or, still better, who is it that "informed" them about the harmfulness of nuclear power and problems in that area?

There has also been a lot of manipulation with the fear of new borrowing abroad. Mention is made of the "horrifying" billions, and I wonder where those figures were taken from? Perhaps the real motive behind such statements is the fear that nuclear power will "eat up" all the money, and there will not be enough for other investment projects. Yet there has been the greatest manipulation in connection with ecology. We all know that even electricity is hazardous, but no one is afraid of a battery or an ordinary transistor radio. Intense radiation is also hazardous, but the radiation caused by a nuclear power plant is considerably less than is thought. The difference between a dangerous dose and the one from a nuclear power plant is even greater than the gap between the danger of high tension and the radio battery.

VJESNIK: We have to add that all of this pertains to a time in which the nuclear power plant is operating without any sort of major difficulties and also that there are differing opinions about this. While the discussions are still going on, it would also be worthwhile to say something about whether anything has changed in our nuclear plans in view of so much doubt or even protest?

Ivan Medvedec: I think that we should emphasize that not a single of the official decisions about carrying out the Yugoslav nuclear program has changed. I am referring here above all to the decisions of the SFRY State Presidency dating from 1977 and 1985 which place an obligation to all sociopolitical and economic structures in the country to equip themselves for construction of nuclear power plants in the country and abroad, in other words, for the complete transfer of the technology. The Yugoslav electric power industry has done four studies in which they work up the country's power needs up to the year 2000, domestic energy resources, the capabilities of the Yugoslav machinebuilding industry and the industry which makes power engineering equipment, and the international aspects of the use of atomic energy for peaceful purposes. Thus the assessment is that by the year 2010 we should build all of 25,000 megawatts of capacity in nuclear power plants, and 12,000 megawatts by no later than the year 2000. In view of the objective capabilities for construction, the nuclear program has for the present, as is well known, been reduced to four nuclear power plants each with a capacity of 1,000 megawatts.

However, it should be said that the decisionmaking on this matter went through social compacts and self-management accords which were signed by all the republics and provinces and all those involved, which means the electric power industry, the industrial sector.... Last year an agreement was signed in Novi Sad to invite bids on four nuclear power plants, and it was decided that the electric power industry would help to cover the costs of that tender. In short, complete legality of decisionmaking was guaranteed, and all the necessary documents have been published in the appropriate official gazette. That is, they were accessible to the public.

Since I work at the "Krsko" NE, I would add that our first nuclear power plant is completely open to the public, and the purpose is precisely in order to demystify nuclear technology. There is not a single citizen or institution whom we have not informed about everything they were interested in concerning the operation of the "Krsko" NE if they only showed the desire.

VJESNIK: Tell us briefly what has been the experience with our nuclear power plant so far.

Ivan Medvedec: The power plant has been in operation 3.5 years, so far it has generated about 15 billion kilowatt-hours without a single incident concerning the personnel working in it.

As for actions against similar projects, which have recently been frequent in the press and on television, I say that the people who participate in them are far from the problems involved in carrying out a nuclear program. I am thinking here of their professional background and what they do every day, and all those actions also have political overtones. I think that the policymakers ought to be concerned with this and something done through the Socialist Alliance and the League of Communists. It is strange that people should make an appearance here like Dimov, Kulic, Ivanovic, and others. You have Kulic, take Kulic, who presents himself as head of the Center for Strategic Research, and even says that radioactive waste is not buried or stored, but concealed.

VJESNIK: Along with the note that we have already announced that Slavko Kulic will come to talk about his view of nuclear power plants, you will have to admit that in the end it seems more and more that the press is "principally to blame" for the wave of indisposition toward nuclear power plants.

Naim Afgan: When we discuss nuclear power and our society, we have to find a way of explaining things to people who have been brought to the verge of fear and frustration. Here the news media ought to play a different role. Our press dare not take the position that the only good news is bad news. The papers which I read are full of precisely that kind of news, and for a long time now not a single good piece of news pertaining to nuclear power has been carried over from scientific journals in the world. I could list at least a dozen prestigious journals published in the world which have never been quoted. So, a certain climate is being created....

VJESNIK: Let us get back to the nuclear power plants themselves. How much truth is there in certain assertions that even without them we could go into the next century if we make full use of our own sources of energy?

Zarko Petrovic: All of a sudden it is being argued that we have an abundance of hydropower and coal and why should we be pushed into adopting expensive and dangerous imported technology when we have enough safe conventional sources? I have brought a whole heap of documents which prove the opposite, and as far as SR Croatia is concerned, I would recall that in 1978 we drafted and revised the master energy balance of the electric power industry in the republic and that those documents went through all the authoritative forums. All of that has now been supplemented by a new study which took into account the trouble with foreign exchange, and we especially concerned ourselves with seeking the pattern of the most favorable sources of energy. A complete inventory was made of energy resources in the republic, the computers process some 500-600 possible combinations, and we finally arrived at the best possible pattern of energy sources under present conditions. That is how we arrived at the program which states what should be built in what order, and it says that we have to make use of hydropower, power plants with pumped storage, coal-fired thermal electric power plants, converted oil-fired plants, and only at the end, as an additional segment, is nuclear power to be found. A plan was drawn up for development of the electric power industry over the period from 1986 to 1990, and it was put up for public discussion.

VJESNIK: Does this mean that no alternative energy program of the republic or Yugoslavia was drawn up or at least an attempt made to draw one up without nuclear power, a program in which not only would full use be made of domestic resources, but it would also call for more optimum use of energy and conservation?

Zarko Petrovic: Some 20 such versions were drawn up in order first of all to use all the hydropower and then not to build nuclear power plants, but coal-fired thermal plants. And it turned out that somewhere around the year 2010 we would not have a single kilogram of coal left!

Milan Novak: The SFRY State Presidency has twice committed itself to the nuclear program after analyzing energy resources and the strategy for overall development. It did not commit itself to deadlines, since these are completely technical matters, and also consumption is changing in view of society's development and general economic conditions. I would recall that carrying out the nuclear program will take at least 10 or indeed even 15 years, and that we dare not miss that train. As for SR Croatia, it is well known that the energy resources of our republic are approximately threefold scantier than the Yugoslav average, and the primary energy our country possesses is one-sixth of the world average. Simple arithmetic shows that Croatia's energy resources are one-eighteenth of the world average.

Zarko Petrovic: Doesn't all this show that we cannot go into the next century without nuclear power? The alternative is between a nuclear power plant and cutbacks on the use of electric power.

Milan Novak: Some countries are turning toward imported electric power, and since power from nuclear power plants represents an ever greater percentage of world production, we would undoubtedly be importing "atomic power" however much some people would like to persuade us that this is not so. I would therefore say that when it comes to energy strategy, the alternative is not only darkness, but also ever greater dependence upon imports.

It is envisaged in SR Croatia that electric power consumption will increase at an annual rate of 4.5 percent up to the year 1995 and later even at a rate of 6 percent. Assuming, of course, that we actually have that power. Incidentally, there has also been a great deal of manipulation with these forecasts of the growth of consumption. At the present level of power consumption in Yugoslavia we are the third in Europe, but at the bottom of the ladder! Every place up from the bottom also means a large growth of consumption. The envisaged growth, and I take responsibility for this assertion, is not large at all, especially if we want to achieve a growth of the social product between 2.5 and 3 percent.

Let me immediately clear up another frequent error in reflections about consumption of electricity. The percentage of consumption of electric power must be higher than the growth of the social product, but the consumption of primary energy must increase by a smaller percentage. After all, as the standard of living and the country's economic might increase, more and more electricity is used.

I would also say something which I consider extremely important to Croatia's future with respect to energy. It is true that there is gas and some petroleum in our republic. But all of that is not even enough to meet the needs of Croatia itself, and the difference between consumption and the capability for production is made up with imports. There is some coal at Rasa, but the remaining hydropower offers at most 4 billion kilowatt-hours of new power from hydroelectric power plants. That is why development of the fuel and power industry in SR Croatia must go in two directions: utilizing the remaining hydropotential of any significance and the coal reserves, concerning which the effort to conclude an agreement among the republics has been extremely difficult and slow, and turning toward the nuclear program. But that must be a Yugoslav program. Not because we ourselves would not be financially able to afford such an undertaking, but out of the need to reflect on this matter at the level of the entire country. In short, along each of the directions of development there is a need for more community spirit, more specific agreements, and more understanding for the energy troubles faced by the entire country, which will be increasingly serious as the years pass.

VJESNIK: Can there be any more considerable conservation of energy so as to avoid construction of any of the nuclear power plants in that way?

Milan Novak: The republic committee has recently concerned itself more than ever with analyzing energy consumption, and we have arrived at the conclusion that our energy consumption is extremely inefficient! But we have gotten into this situation in large part because of the poor technology which we purchased at the very time when others, the advanced world, were giving it up on a large scale. But carrying out a very extensive program for more optimum energy consumption requires investment of immense capital.

VJESNIK: Changing the structure of the Yugoslav economy would certainly conserve a great deal of electricity or energy in general....

Danilo Feretic: On the question of consumption or conservation I will quote a figure from West Germany. A 19-percent growth of the social product reduced energy consumption 3 percent, but electricity consumption increased 24 percent!

Zeljko Pavlovic: A change in the technological pattern of the entire economy and the training of personnel can be accomplished only over a period of 15 years, and it in fact took twice as much time for many more advanced countries to do this.

VJESNIK: What would happen if Yugoslavia renounced the "nuclear package" in spite of the invitation for bids?

Zarko Petrovic: In that case we would be subject to the Law on International Competitions. There would be many troubles then, since we have to take into account that in addition to paying $20,000 to purchase the tender, each of those competing for the construction contract has invested another $1.5 to $2 million to prepare its bid.

VJESNIK: Should we really be so afraid of those penalties, can Yugoslavia allow itself to do that?

Zarko Petrovic: It is my opinion that Yugoslavia must not allow itself at one and the same time to approve the invitation for bids, to "approve" this kind of action against the nuclear program, and finally use the new law on foreign exchange to give a good drubbing to the planned model for financing construction of the nuclear power plant.

Djuro Miljanic: A few days before the invitation for bids was published there was a meeting of the Nuclear Energy Commission of the Federal Executive Council chaired by its chairwoman Milka Planinc by virtue of her position, and among others the commission included the chairmen of the executive councils of the republics and provinces. This meeting gave the "green light" to publishing the invitation for bids, and it came at the end of a long chain of consultations at the national level.

Naim Afgan: It should also be said that it is not even possible for us not to make a decision on carrying out the nuclear program. But this would involve all manner of adverse consequences for development of the country in one of the most important areas.

VJESNIK: A few days ago there was a news item that one opstina has prohibited construction of storage facilities for nuclear waste, and we have also heard about the decision of the Chamber of Associated Labor of the Assembly of SAP Vojvodina which has rejected the possibility of a nuclear power plant being built in that province. On what basis can such a decision be made, and is this not a phenomenon which is going to be increasingly frequent from now on? What would happen if the fear and hysteria which occur because people are not well enough informed about what is actually involved were to seize others as well?

Naim Afgan: Under the constitution, with respect to investment projects, I think that a permit must be obtained from the competent sociopolitical community. If a permit is not obtained, there can be no construction. Incidentally, something similar happened with the site for possible construction of a nuclear power plant at Vir. But when permits are applied for, there should also be clarification as to what a nuclear power plant is and everything that it would bring to that region. For example, how much would it contribute to the faster development of that town and the entire region? How many people obtain jobs with very good income in Krsko, how much does a source of energy mean for industrial development and the growth of new jobs? These are the things which the news media talk least about, but the electric power industry has also failed in offering data of this kind. Instead, people are served up terrifying stories about cancer, leukemia....

Zeljko Pavlovic: Before the "Krsko" NE was built, that opstina was one of the poorest developed in SR Slovenia. Today in its level of development it is the third sociopolitical community in that republic. Not only because of the power plant itself, but because of all the accompanying activities which have developed in that complex.

Milan Novak: It seems that in examining why there is such a hue and cry about nuclear power plants from certain quarters we should think especially about the developmental impact, i.e., about the location to which social capital is to be committed and about the fear that it will "escape" some people. In accordance with the social compacts there ought not to be fear that the capital will be committed to only one region. The nuclear program ought to bring us closer together and unify us, since numerous Yugoslav organizations of associated labor have participated in it. The general lack of confidence that is manifested at the moment is sowing the seeds of something which would divide us, as some people anticipate!

I agree with open dialogues about nuclear power plants and about everything that they bring, but we dare not allow ethnic divisions and other lines of division to be drawn in the space we have left open because we were late to act in providing all the working people additional information.

[Box, lower left]

Dr Branko Lalovic of the Nuclear Science Institute in Vinca: Five Proposals

Just before we put the paper to bed we received a letter from Dr Branko Lalovic of the "Boris Kidric" Nuclear Science Institute in Vinca, who was prevented from attending our roundtable discussion. He proposed several questions for continuation of the discussion of the future with respect to energy which on this occasion we are opening up in the pages of NEDELJNI VJESNIK.

"I feel that before a decision is made on the nuclear future, other possibilities should also be investigated. With respect to optimalization of consumption and use of renewable sources of energy, and that is what I am mostly concerned with, very little has been done, but experience in the world shows that there is a great untapped potential here," Dr Lalovic said, and he went on to offer five proposals:

"I would recommend that before energy plans are drafted the most responsible people should do the following: First, let them make a trip from Pula to Dubrovnik and ask themselves why there are hardly any solar hot-water heaters on the houses, while the opposite is the case in Greece; and then let them visit Denmark, as was recently done by an Irish energy minister, and study how in a few years the Danes have managed to cut back energy consumption for heating all of 40 percent; third, let them visit the European Economic Community and pick up the dozens of various publications (all of them free) in which the opportunities for energy conservation in industry are described. The fourth proposal is that they invest one-tenth of the expenditure for just one nuclear plant to develop, say, television sets which would consume 5 watts instead of 120 and light bulbs which are sixfold more economical for the same output, and finally, let them carefully and without prejudice read what we 'solarists' are proposing and then conduct an objective debate about our energy future." We also received similar letters for calls for discussion from other energy experts, and we will be writing about them in later issues of NEDELJNI VJESNIK.

[Box, right]

Possible Builders of the Nuclear Power Plants?

The deadline for receiving bids for construction of nuclear power plants in Yugoslavia expires at 1200 hours on 26 April, and then the bids will be evaluated according to the content of the tender and the Social Compact on the Uniform Procedure for Selection. The decision will be made by the electric power companies of five republics and one province (SR Montenegro and SAP Kosovo did not join in adopting the "nuclear package") and the Yugoslav industry belonging to the organization JUMEL.

At the price of $20,000 the tender was taken by the firms AECL (Canada), Westinghouse (United States), Ansaldo (Italy), Framatome, Aesthome, and Cogem (France), KWU (West Germany), Mitsubishi and Mitsui (Japan), the Government Commission for Nuclear Power of Argentina, and "Atomenergoexport" (USSR). Among domestic work organizations the tender was purchased (at a price of 600,000 dinars) by "Metalna" of Maribor, by "Slovenija Ceste" of Ljubljana, by "Iskra" of Kranja, by "Djuro Djakovic" of Slavonski Brod, by "Jugoturbina" of Karlovac, by "Energoinvest" of Sarajevo, by MIN of Nis, by "Gosa" of Smederevske Palanke, and by "Rade Koncar" and INA-Project of Zagreb.

This, then, is the group of potential builders of the nuclear power plants, and when all the bids are in and the final decision is made we will know what part of the domestic industry will tackle the "job of the century" and what foreign trading partner it will be working with.

7045
CSO: 5100/3028

NUCLEAR POWER PLANTS SAID TO BE UNECONOMIC, UNNECESSARY

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 15-17 Mar 86 p 12

[Excerpt] The view of the workers council of the Associated Electric Power Industry of Belgrade, which discussed at the end of last week further investment in research of nuclear raw materials, is that one cannot accept the assessment that building nuclear powerplants is economical for the country and that they are necessary at this time because of the rapid exhaustion of domestic coal and water resources.

Delegates at the special meeting [of the council] were surprised by the agenda item on preparations for building nuclear powerplants, since the meeting was called above all to reach agreement on common elements in forming prices for electric power in Yugoslavia. Resistance to atomic powerplants was immediately expressed in the discussion and as a result, decisions on allocating funds for further research in preparation for their construction were postponed.

In the end it turned out that no one was against research which will prepare Serbia to enter into this work if nuclear power plants are shown to be necessary in the 1995-2000 period. The Associated Electric Power Industry believes water and coal resources make it possible to be cautious about issuing decisions regarding the time for building nuclear power plants, [also] because of the possibility that new technology will appear [in this field]. On the basis of this, the Associated Electric Power Industry will define what will be done so that a decision will be made for the periods when there is a shortage of traditional fuel.

/8918
CSO: 5100/3029

YUGOSLAVIA

DEVELOPMENT OF NUCLEAR POWER PLANT PROGRAM SURVEYED

Belgrade EKONOMSKA POLITIKA in Serbo-Croatian 17 Mar 86 pp 19-21

[Article by Dragoslav Nedljkovic: "Unity on the NE Program"; first paragraph is EKONOMSKA POLITIKA introduction]

[Text] It is difficult to discern why suddenly and unexpectedly so much space in the news media is being devoted to nuclear power plants at the height of the public discussion of the critical analysis of the political system and on the eve of the elections, the party conferences and congresses, and the change of executive bodies. For almost a month now the newspapers, radio, and television have been flooded with news items, opinions, and views concerning nuclear energy without any direct occasion, roundtable discussions, lectures, interviews, and lecture series are being organized, and everyone is becoming involved from young people and writers to the delegate assemblies and the LCY Central Committee. Everything is being published, from news items and analysis of foreign experiences to the personal predispositions of individuals, and a Yugoslav referendum is being demanded on the question of being for or against the introduction of nuclear power.

Even the experts cannot get their bearings in this profusion of contradictory information. When in the Western countries the advocates of preserving the environment, the Greens, as they are popularly referred to, organized protest marches and printed up posters and pamphlets, it was said that this was organized and financed by espionage centers in the opposite ideological camp. Manufacturers of equipment for nuclear power plants and their builders in the West feel even today that the lack of confidence of the public, or put more accurately, the lack of adequate information and the excessive exclusiveness and secrecy about construction and operation of nuclear power plants, is one of the principal oversights and causes of the standstill. Who is it that will be accused in our country?

To say that domestic energy people committed the same oversight with informing the public is obviously not enough. A referendum is not even necessary on that account, since its outcome is known in advance. In essence, however, there is no dilemma about introducing nuclear energy into the Yugoslav electric power system, and it is being created artificially. It was permitted back in 1974, when construction began on the Krsko NE, the first nuclear power plant which has been operating for 4 years now. Whether it is to be joined in this century by one or two more nuclear power plants is the real question, especially since the new power plants are to be built on an entirely different principle from the first one. It is well known that the Krsko NE was built on the "turnkey" principle, with predominantly foreign credit financing.

How To Avoid Division

The nuclear program as it is now under discussion was brought about by several circumstances. Even some 20 years ago energy specialists in the Serbian Academy of Sciences and Arts organized three scientific symposiums: on domestic sources of energy, on the growth of consumption, and on the future facilities that would meet that demand. In compressed form the conclusions (which incidentally are well known) of those gatherings run this way: a) Yugoslavia does not have an abundance of natural energy resources, b) consumption will continue to increase at a rapid pace, and c) assuming optimum use of conventional sources there will be a need to bring in new technologies and processes for the production of energy. This was followed by several analyses and studies concerning the need to use nuclear energy in the electric power industry. Thus some 10 years ago it was estimated that electric power consumption in Yugoslavia would reach 230 billion kwh a year at the beginning of the next century. Assuming maximum utilization of the remaining hydroelectric potential and construction of thermal electric power plants at all the sizable coal deposits, calculations have shown that consumption could be "covered" by conventional sources up to the year 2025, but after that exclusively nuclear power plants would have to be built.

In that period nuclear power plants seemed like the only source of electric power for the future, and it was also said that they would be more economical than the conventional power stations. The domestic dilemma was whether to wait 40 to 50 years and only then to build nuclear power plants or to gradually bring them into the system, master the technology, and impart the capability to the industrial sector. The professional opinion that prevailed was that for the electric power industry and even more for the industrial sector, for which this would be an engineering and technological leap forward and an opportunity for getting out into the world, it would be better to build nuclear power plants than to use conventional domestic sources of energy.

A country's electric power industry, as a large technical and economic system, has great advantages over partial regional systems: immense savings are possible in construction of new projects, in building up standby power, and in optimizing utilization of facilities already built. When discussion began concerning construction of 10 or 12 nuclear power plants by the year 2000, Yugoslavia's electric power system was artificially divided into 8 republic and provincial entities, and the experience with that division had been very bad. The most recent study by "Energoprojekt" shows that assuming the system were placed on an economic foundation, it would be possible today to save 1,000 MW of installed capacity just in the construction of new projects (the price per megawatt is $1 million for thermal electric power plants, which means that the saving would amount to $1 billion). But the bad experiences were not confined to more expensive construction alone. The "independence" of the sociopolitical communities and their electric power industries resulted in the importation of a motley variety of equipment, especially for thermal electric power plants, every organization had ties to "its own" foreign trading partner, the level of borrowing abroad was high, and the domestic industry was left without work. "The concomitant difficulties" have been shortages of electric power, power cutbacks (no one has even attempted to calculate how much they cost), losses in the electric power industry, a lag in development, and so on.

The desire to avoid divisions and their consequences has not been publicly expressed, but the specialists believed that it had to be imposed on large and expensive projects with significant technical advances which do not tolerate fragmented systems. That is how the ring of high-tension long-distance transmission lines was carried out; this exceptional engineering solution makes it possible to build power plants according to the location of the natural resources and to transmit power to consumers virtually without losses, but nothing changed. The divisions were even reinforced and became deeper. That is how the nuclear program came to be conceived. It turned out that in the fragmented system not a single electric power organization had the technical capabilities of either incorporating a nuclear electric power plant or making the financial investment. The program simply made it a necessity to work together.

Strategic Designs

On the basis of several studies on the inclusion of nuclear power plants, the mastering of nuclear technology and the tacit "conspiracy" of the specialists resulted in a sociopolitical commitment and strategic designs for applying nuclear power plants in Yugoslavia. In 1977 the SFRY State Presidency stated the following basic premises: a) nuclear power plants had to be incorporated into the electric power industry, b) it was essential to equip the domestic industrial sector as much as possible for building nuclear power plants within the country and in the world, and c) gradually a capability had to be developed in this field and the entire range of the nuclear fuel cycle mastered.

It is difficult to explain in a few words why it took 5 years for the Federal Executive Council and the republics and provinces to arrive at the Agreement on Use of Nuclear Energy, and after that another 3 years for the electric power industries to agree on a procedure for arriving at a single fuel cycle and single type of reactor. It seems that there was a mistake at the outset--the barriers and divisions in the electric power industry cannot be erased by new and more up-to-date facilities, since it is pointless to build a modern building on rotten foundations. It seems that it was necessary to do things the other way about--to straighten out relations, above all through economic coercion at the base, and only then to talk about the superstructure.

Over those 8 years that passed from formulation of the strategy of nuclear development until the international competition was advertised for selection of the single fuel cycle and reactor type for the series of nuclear power plants a great many things changed. Estimates of electric power consumption in the year 2000 were cut back drastically from 230 billion to 160 billion kwh. Assuming intensive utilization of domestic natural resources, that is, coal and water, there was also a decrease in the number of nuclear power plants which were to be built. The long-range program for development of the fuel and power industry included four nuclear power plants, one to be put on line in 1995, a second in 1998, and the other two in the first years of the next century. Although within six electric power organizations there are already organizations for preparation and construction of nuclear power plants, the decision has so far been made to build only one--Prevlaka near Zagreb, whose investors are the electric power industries of Croatia and Slovenia.

It is, of course, uncertain what size of consumption of electric power will be achieved in 15 years. That depends on many circumstances, above all on the country's rate of development as a whole, that is, on the manner and road we take in getting out of the present crisis. The stubborn facts say that with a per capita annual consumption of about 3,500 kwh Yugoslavia is near the very bottom among European countries, that is, where the advanced countries were 30-40 years ago. Efficiency of utilization of energy as a whole and also of electric power is extremely poor, and it is getting worse and worse. It took 3.58 megajoules of energy per dinar of the social product in Yugoslavia in 1981, 3.80 in 1982, 4.10 in 1983, and 4.40 in 1984. Consumption per 1,000 dinars of the social product was 151.6 kwh in 1981 and 171 kwh in 1984.

The lag in development and efficient use of energy is also evident to the naked eye, so that radical changes in energy policy, in the valuation of energy, and in consumption are simply imperative. The specialists say that it will be difficult for Yugoslavia to get away from the bottom of the European list of countries even if the present development programs are carried out. And it is almost certain that they cannot be carried out. Full utilization of the remaining hydroelectric potential, opening up mines for 160 million tons, and construction of thermal electric power plants can no longer be carried out over the remaining 14 years even in physical terms, not to mention the investments that would be necessary. The administrative, artificial, and noneconomic divisions in the electric power industry stand in the way of optimum development; neither hydroplants nor thermal electric power plants are being built at the most favorable sites. The classic examples of these are the Drina watershed and the coal deposit in Kosovo, which have been the subjects of disputes for decades now. The "owners" (under the constitution they are the sociopolitical communities) are not utilizing them or are underutilizing them, but they do not allow others to do so. This is compelling the republics and provinces which have scant energy resources to seek a way out through nuclear power plants, since, once again under the constitution, they have a duty to provide energy for their own development.

And although the nuclear program, at least with respect to selection of the fuel cycle and the reactor type, was approached with unity after the detailed and extensive studies, one should have no illusion that the divisions concerning energy have been overcome. The example of choosing sites for nuclear power plants is sufficient. Krsko, which is already on line, and Prevlaka, which is to be built, would be among the least favorable sites in any Yugoslav selection, since the geological conditions, seismic situation, amount of water for cooling and other essential elements have required increased investments at those sites. On the basis of studies done so far the best location for a nuclear power plant is at Djerdap, but this is not even mentioned as a site for a future nuclear power plant. The real paradox and pattern of behavior are represented by what is happening in Vojvodina: the electric power industry in that province has made a stipulation on its willingness to build a nuclear power plant jointly with other organizations, and the condition is that it be located in Vojvodina. The delegates to the Vojvodina Assembly have passed a law establishing an organization for preparation of construction and providing the funds, but a few days ago (as though their memory had failed them) they ordered the halting of all preparations and an inquiry to find out who made the decision.

The divisions over energy which affect the nuclear program are not confined to the choice of a site. It seems that they are still more evident concerning choice of a foreign supplier of the reactor and technology; this question involves not only the electric power industries, but also the project planning organizations, researchers, machinebuilders, assemblers, construction contractors, and other participants in the "big job." This is a separate topic which we soon will be addressing.

Delays Again

It is difficult to believe that the members of the SFRY State Presidency in 1977, when the strategy for inclusion of nuclear power plants was formulated, were aware how much time it would take to arrive at a Yugoslav program governing nuclear power plants. It seems they did not even suspect (nor in fact did the most eminent world specialists) that in less than 10 years nuclear technology in certain countries would be proclaimed outdated and superseded, technology for the scrap heap. To tell the truth, the reports and analyses coming in from the world on nuclear power plants have not been complete or thorough. Whereas they are being completely rejected in some countries, construction is being halted, and plans are being made to shut them down, they are being built at a fast pace in other countries. In both cases electric power consumption is the principal factor: structural changes in the economy, optimalization of energy consumption, and other factors have made the former plans for the growth of consumption unrealistic in several countries, but in those countries which are "energy-hungry" they are continuing to build nuclear power plants if at a slower pace. Safety requirements, ecology, waste disposal, and the disassembly of nuclear power plants are making nuclear technology considerably more expensive (true solutions have not yet been found for some of these problems), so that there are additional reasons for doubt.

Yet the future for energy is being spoken about little and timidly. Whereas nuclear power plants represent the future, that is, what will be happening over the next 10-15 years, for our energy people, for the world at large the future is represented by new technologies, more accurately, predictions running several decades ahead. A majority of specialists agree that the world's energy future lies in fusion, the use of deuterium, which guarantees an abundance of energy with no impact on the environment. Breeders, migma cells, and the like are being mentioned. It seems that the technical problems have been solved for fusion, but commercial use will probably take 3 to 4 decades. Immense resources have been invested in research on this new technology, and a part of the campaign against nuclear power plants should be viewed as a need to get back that investment and make money. The use of fusion is the immediate future for planners. It is certain that this technology will cost fabulous amounts and that only a few countries will possess it.

In that light the story about the Yugoslav nuclear program requires thorough reassessment and adjustments. The question is posed once again whether to build a series of nuclear power plants or to wait for the new technologies by making intensive use of conventional energy resources. Even if it is necessary to build several nuclear power plants until fusion is accessible, it is late to carry out a strategic commitment on adoption of a nuclear fuel cycle and to equip the industrial sector for manufacturing vital parts of nuclear power plants. Over the 3.5 decades since the first nuclear power plants went on line in the world the domestic industry has not managed to become involved in nuclear technology. There is an exception in a few organizations which have for years been fairly successful in making parts for nuclear power plants of the VVR type (the Soviet type of light-water reactor). All attempts to obtain contracts for other types of power plants of foreign manufacturers have been unsuccessful.

It would not be out of the way to recall that one of the fundamental principles of the strategy of the nuclear program dating back some 10 years was to equip the domestic industry as much as possible to build nuclear power plants within the country and in the world. Adoption of the fuel cycle involves mastering some 8 completely new industries and technologies if we are talking about enriched uranium as a fuel, and it makes economic sense only if 10 or so nuclear power plants are built.

One of the characteristics of Yugoslavia's energy development has been its constant tardiness and blind following of changes in the world, its sluggish adaptation to world trends, and in certain periods its moving in completely the opposite direction. When the world was cutting back petroleum consumption, we recorded our largest growth; whereas optimality and efficiency have increased in the consumption of energy, in our country energy is wasted and efficiency is deteriorating; when others stopped building oil-fired thermal electric power plants, we were just getting started. Is the same thing going to happen with the nuclear program? It is obvious that the energy situation as a whole imposes a different approach, from placing an economic value on the sources of energy and production to eliminating artificial divisions. It is also certain that the nuclear program may not be an exception; if overall relations have been set up badly, it is an illusion to expect that high technology will follow a different road.

[Box, p 21]

A Loss Avoided

The Krsko Nuclear Power Plant operated over the past year for the first time as a work organization--up until now it has been an organization under construction. Its first year-end statement did not show a loss (although given the noneconomic power rates, a loss need not reflect business performance) since the sociopolitical community covered in advance the losing business operation.

The investments in Krsko, with an installed capacity of 664 MW, amounted to slightly more than $700 million, which at the time of construction was not excessively expensive in the dollar amount when compared to world prices of that period. Foreign credits represented about $550 million. Since the credits are not being repaid, but the debts are being rescheduled, Krsko is becoming more expensive even after completion of all the work. The foreign debt, according to unofficial reports, has already exceeded $1 billion.

7045
CSO: 5100/3030

ACADEMICIANS ON POSTPONEMENT OF NUCLEAR PLANT CONSTRUCTION

Belgrade PRIVREDNI PREGLED in Serbo-Croatian 21 Mar 86 p 8

[Excerpt] The 3-hour exchange of views by the most prominent energy specialists in the country at the Inter-Academic Council for Energy in Belgrade on the need to build nuclear powerplants can be summarized as follows: The construction of nuclear powerplants can be postponed; although there is not so much time, so it should be used to the maximum to gain a perception of the coal and water potential reserves and their accelerated use in electric power production, to introduce more efficient consumption of power, and to train specialists for selecting and applying more modern nuclear technology.

According to the comprehensive speech by Academician Hrvoj Pozar on domestic resources and assessments on the increase in electric power consumption up to 2020, on the need for nuclear plants in the electric power system, on investments for building various electric powerplants and the cost of electric power, power from nuclear plants will be needed after the year 2020. This means that by then a specific number of them should be built. Pozar gave several variants on inclusion of nuclear plants in the power system, depending on power consumption and use of coal reserves and the building of mines. The lowest increase in consumption of electric power ranges from 3.7 to 3.95 percent annually. By the year 2020, 12 nuclear powerplants should be built in order to meet somewhat higher consumption than this; and in order to meet needs above a 6-percent annual increase, 21 nuclear plants of 1,000 megawatts should be built.

As noted in the discussion, Pozar used only the coal and water reserves from the Strategy on Long-Term Development of Energy. Prof Dr Momcilo Simobovic, however, brought out data on newly established reserves which are about 40 percent higher and which pertain largely to reserves in Kosovo.

Academician Pavle Savic, a pioneer in nuclear science in Yugoslavia and one of the oldest researchers in the world, said that one needs more 'modesty' now and it is more a question of the efficient consumption of energy and the preparation of personnel [in the field of] fast reactors to be used in the future; none of the developed countries are building any longer those which are now being offered, [he said].

/8918
CSO: 5100/3029

BRIEFS

PUMP UNITS FOR USSR--Nis, 7 March (TANJUG)--The machine producer "Min" of Nis and the Soviet enterprise "Atomenergoexport" of Moscow has signed a new contract on the delivery of 12 pump units for Soviet nuclear power plants. The 4 million dollar project is to be completed in 1987. The pump units will be produced by the factory "Jastrebac" of Nis, a constituent part of "Min". "Min" will this year deliver 20 pump units for nuclear power plants to partners in the Soviet Union, Bulgaria, Czechoslovakia and the German Democratic Republic. The deliveries are valued at some 7 million dollars. [Text] [Belgrade TANJUG in English 0930 GMT 7 Mar 86 LD] /12913

URANIUM FROM PHOSPHORIC ACID--Belgrade, 31 March (TANJUG)--After three years of research Yugoslav scientists have mastered a process for separating uranium from phosphoric acid, it was announced here today. The country's first quantity of uranium concentrated was obtained in a [word indistinct] industrial facility at the chemical plant in Prahovo, eastern Yugoslavia. An investment programme to build the country's first industrial facility for the production of uranium by this method will go ahead if current investigation proves the project profitable. The programme is being financed by Nuklearna, an enterprise affiliated to the electric power industry of the Republic of Serbia. The republic has not yet made a decision on building a nuclear power plant. Yugoslavia has one nuclear station at present, Krsko, and is making preparations for the eventual building of another four. [Text] [Belgrade TANJUG in English 1723 GMT 31 Mar 86 LD] /12913

CSO: 5100/3032

INTER-AMERICAN AFFAIRS

BRIEFS

ARGENTINE-BRAZILIAN NUCLEAR POLICY MEETING--Buenos Aires, 25 Mar (NA)--The Foreign Ministry has officially reported that the first bilateral Argentine-Brazilian meeting on nuclear policy took place here yesterday and today. This meeting was scheduled in the joint declaration signed by Presidents Alfonsin and Sarney in Aguazu last November. The delgations were headed by Ambassador Jorge Sabato, secretary of foreign relations and culture, representing Argentina; and by Ambassador Sebastian Rego Barros, representing Brazil. The technical aspects of the meeting were coordinated by Alberto Constantini, chairman of the National Atomic Energy Commission; and by Rex Nazare Alves, chairman of the Brazilian Nuclear Energy Commission. The next meeting will take place in Brasilia in the first week of August, according to the Foreign Ministry. [Text] [Buenos Aires NOTICIAS ARGENTINAS in Spanish 2200 GMT 25 Mar 86 PY] /9738

CSO: 5100/2056

ARGENTINA

CNEA TO DEFINE NEW NUCLEAR POWER PLANTS

PY291644 Buenos Aires TELAM in Spanish 1949 GMT 26 Mar 86

[Text] Buenos Aires, 26 March (TELAM)--By resolution, the Argentine Government has decided that the National Commission for Atomic Energy (CNEA) will be charged with defining, for the natural uranium-heavy water line, the type of nuclear power plant best suiting the country.

This resolution was enacted through executive Decree No. 423, which was released tonight at Government House, and charges the CNEA with defining the most appropriate capacity module of the nuclear power plants in order to fulfill the goals set by the energy program through the year 2000. The preamble for the decree notes that, in its energy program, which has already been drawn up, the Public Works and Services Ministry foresees the installation of a 700-megawatt nuclear power capacity before the year 2000.

The preamble adds that for an appropriate planning of the CNEA activities and those of the entire Argentine nuclear industry, it is indispensalbe to determine, for the natural uranium-heavy water line, the type of power plant to be built and the capacity module. The decree emphasizes that it is important to speed up the technical studies to locate a site for the fourth nuclear power plant and to decide the type of power plant in order to permit the greatest possible participation of the Argentine industry and engineering.

/12913
CSO: 5100/2057

GOLDEMBERG COMMENTS ON FRG ACCORD, NUCLEAR BOMB

Sao Paulo ISTOE in Portuguese 19 Feb 86 pp 70-71

[Interview with Jose Goldemberg by Maria Helena Passos]

[Excerpts] One of the most outspoken critics of the 1975 Brazil-Germany nuclear accord, southern physicist Jose Goldemberg, 58, has stepped into his role as rector of the University of Sao Paulo armed with attributes that go beyond the prestige he garnered as president of the Brazilian Society for the Advancement of Science [SBPC] and of the Brazilian Physics Association. After 3 years successfully headding the three state electrical energy enterprises in Sao Paulo under the Montoro government, he is ready to reinvigorate the USP, stimulating research, recovering the professional pride of its professors and garnering additional funds. Moreover, he is taking a more critical stance with respect to the New Republic, no longer advocates, as before, the total revocation of the nuclear accord, and does not disguise his aspirations to a future ministerial position.

[Question] In your view, is Brazilian scientific development satisfactory?

[Answer] Areas such as computer science, electronic engineering, physics and genetics are doing reasonably well. On the other hand, there are other sectors which are on shaky ground. We need to strengthen them, and I intend to do just that. I will begin with a special fund, with extra-budgetary resources, to be administered by the rectories of the Sao Paulo universities to assist areas lacking in research. The groups financing research have priorities, which stimulate some areas while ignoring others. For example, metallurgical engineering in Brazil has, up until now, not been well developed, whereas space research has. Which does Brazil need most, metallurgical engineering or space research? At the same time, there are limits fixed by the scientists' own biases which influence the development of research. If these biases were formed on the basis of regional needs, there would be no problem. But they are formed outside of the country. It is fashion that determines, for example, the research done in elementary particles in physics.

[Question] The Brazil-Germany nuclear accord was the target of some of your sharpest criticisms in the 1970's. Have you changed your position?

[Answer] We have to be realistic. It is not possible to do away with Angra II, the first German reactor. The equipment is all bought and debt is owed. I think the accord should be broken with respect to the other reactors in the future. Angra III is plainly an unknown quantity. It would need to be examined in greater depth, but I think it would be a good idea to sell the equipment already purchased to another country. That might appear to be a bit of a retreat on my part, but it is realistic and avoids the total loss of the 4 billion dollars already invested.

[Question] Are you satisfied by the commission named by Minister Aureliano Chaves to study the accord?

[Answer] It ended up being slanted in favor of nuclear energy. For that reason, the SBPC and the Brazilian Physics Association formed their own team to study the program and I was invited to head it. I proposed that it not begin its work until after Aureliano's commission has concluded its own. That way we would get a chance to hear them out.

[Question] That was a political position, right?

[Answer] It is the position of a good boy, something not very common in my life.

[Question] Do you believe that the military is developing plans for the Brazilian atomic bomb?

[Answer] I have no doubts that the plan exists. They are developing activities seemingly not aimed at construction of the atomic bomb, but which augment Brazil's capacity in the area of nuclear energy, with possible military applications.

[Question] Two years ago, you told ISTOE that the military did not have the ability to do that.

[Answer] That work is technically complicated. It's going to be difficult for them to do it alone.

[Question] In that case, should Brazilian scientists act as they did when they fought the nuclear accord 10 years ago?

[Answer] Certainly. They have been timid in the face of the already high costs that the country has incurred because of this. The scientists are going to study the parallel plans in an independent commission. If Aureliano's commission does not take action on it, the scientists will step up their activities.

[Question] Has the recently created Ministry of Science and Technology been effective in improving laboratories and providing funds for research?

[Answer] It was a good beginning, very much improving the dialogue between scientists and the government. But it started out amputated. It should have brought together many other activities responsible for science and technology--such as the National Institute of Industrial Property, which controls the entry of foreign technology, and the National Commission for Nuclear Energy (CNEN). It only retains the National Council of Scientific and Technological Development and the Research and Studies Bank. To dress these two old organizations in new clothes does not change very much: they still don't have much money. Minister Renato Archer has performed his duties reasonably well, but the means at his disposal are extremely limited.

[Question] Do you foresee the inclusion of the CNEN in the Ministry of Science and Technology under the New Republic?

[Answer] I am very skeptical. The New Republic has already been disappointing in several areas. It could have taken firmer actions and did not. For example, in the Brazilian Forestry Development Institute, the president was fired for corruption and almost 6 months passed before measures were taken to improve morale.

[Question] What is the Brazilian scientist's role in this framework?

[Answer] The majority of my colleagues have adopted the position of collaborating with and supporting the government. But a lack of resources is already making itself felt. They are tired of supporting a government that is not able to state its position with regard to fundamental issues. Personally, I believe that the scientific community should continue to collaborate while taking an increasingly demanding stance.

[Question] But you would like to hold a ministerial position, right?

[Answer] Yes. The president of the republic gives very few orders to the ministers and they have considerable freedom. But I am not attracted to a temporary ministry like the next one will be. I would only be interested in taking responsibility in a government that proposes to have a program during an entire term. On the other hand, I wouldn't USP. There I can act and I have a forum to express my opinions.

13026/6662
CSO: 5100/2048

CONSTRUCTION OF FOURTH PLANT CONCERNS FORMER NUCLEN HEAD

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 28 Feb 86 p 36

[Text] Rio--The former director of the Nuclebras Engineering Corporation (NUCLEN), Joaquim Francisco de Carvalho yesterday expressed his concern that the Committee for Evaluation of the Nuclear Program might recommend to the Sarney government construction of another nuclear plant in addition to Angra II and III, with a loss to the nation of $4 billion.

Joaquim de Carvalho, who was recently testifying before that committee, said that he heard one member of that committee support the construction of another plant under the allegation that Brazil will not be able to utilize its hydroelectric potential completely because that would flood many areas usable for agriculture.

In his opinion, the committee should not recommend "such an absurdity" to President Jose Sarney because that would further compromise the investment capacity of the electrical sector, which would end up not even having the funds to build the transmission lines, the lack of which results in blackouts such as those we had last year.

Joaquim de Carvalho supports the position that the Brazilian hydroelectic potential can cover energy demand until the second decade of the next century provided that the program for construction of hydroelectric plants proceeds at its normal pace and that the transmission lines necessary to carry the power to the consuming regions are built. There thus will be sufficient time in the nuclear area to test a prototype reactor and later build that reactor on an industrial scale because the demand for energy will be felt after the year 2015, that is, 30 years from now.

In his testimony, the impression was also left that several members of the committee are in favor of the institutional restructuring of the nuclear sector, with NUCLEBRAS retaining the fuel cycle, ELETROBRAS, the electronuclear activities, and the National Nuclear Energy Commission, the research and applications of radioisotopes in industry, agriculture, and medicine. Regulatory activities and those of control and inspection would be in charge of a new agency to be created and attached directly to the Presidency of the Republic to maintain its independence and authority in relation to the others. According to Joaquim Francisco de Carvalho, the creation of that new agency would be subject to the approval of the national congress.
8711/6662
CSO: 5100/2051

BRAZIL

BUSINESSMAN'S PARTICIPATION IN PARALLEL PROGRAM NOTED

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 25 Feb 86 p 2

[Text] Rio--Businessman Antonio Ermirio de Morais was installed yesterday as a member of the deliberating council of the National Nuclear Energy Commission and participated in its first meeting, which lasted about 3 hours. The chairman of the commission, Rex Nazare Alves, considered this fact indicative of the collaboration that the businessman has always given to the nuclear sector and of the fundamental importance of that technology for Brazilian development.

Rex Nazare Alves explained that although Antonion Ermirio de Morais has been one of the sharpest critics of the Brazilian-German nuclear agreement, he has been collaborating for some time with what is commonly called the parallel or autonomous nuclear program. In that line of collaboration, when the Nuclear Energy Research Institute (IPEN) of Sao Paulo was developing the project for the production of uranium hexafluoride (UF-6) and needed hydrofluoric acid with a low humidity content, it was the Antonio Ermirio de Morais' enterprises that produced that material for IPEN.

Rex Nazare Alves pointed out that the Antonio Ermirio enterprises also have been supplying a special aluminum with a certain type of purity for the manufacture of uranium fuel elements. In his speech greeting Antonio Ermirio, the CNEN chairman said that the commission's foreign debts do not exceed 10 percent of its budget and that thanks to the development of its own technology, the importation of radioisotopes and other nuclear materials is being reduced significantly.

8711/6662
CSO: 5100/2051

BRIEFS

NEW NUCLEAR COMMISSION AUTHORITIES--The following are the newly appointed authorities of the Executive Board of the Chilean Nuclear Energy Commission: Major General Patricio Torres as Mining Ministry representative; Brigadier General Jorge Massa for the National Defense Ministry; Rear Admiral Sergio Altamirano and Brigadier General Luis Reyes as representatives of the president of the Republic. [Summary] [Santiago EL MERCURIO in Spanish 23 Feb 86 p C 2 PY] /9738

CAO: 5100/2055

CONGRESS-I LEADER URGES COHERENT NUCLEAR POLICY

Calcutta THE STATESMAN in English 8 Mar 86 p 13

[Text] New Delhi, March 7--In what looked like a surprise move, Mr K. K. Tewary, secretary of the Congress (I) Parliamentary Party, yesterday asked the Government "to take the nation into confidence and declare a coherent nuclear policy for survival of the country and its hard-won freedom," asserting that "nuclear weapon is necessary for our survival."

In a statement issued to the Press, the party secretary said: "We have been astoundingly ambivalent to this vital issue which concerns our national security, and the very survival of the nation."

He disapproved of the "extraordinary stand" taken by Mr Arun Singh, the State Minister for Defense, in the Janvant programme of Doordarshan "in giving vent to his personal views, though people were interested in knowing whether his personal views had any bearing on the official policy."

According to Mr Tewary, Mr Singh had stated in course of his answers that while the Government of India believed in peaceful uses of nuclear energy, he personally wanted the Government to now exercise its nuclear option and go in for production of nuclear weapons. Mr Tewary thought this "ambivalent" attitude should be given up.

He held that "India's security environment has deteriorated alarmingly and our security system has gaping holes and is no match for the threat scenarios which are emerging due to Pakistan's acquisition of nuclear capability and the total convergence of its geo-strategic interests with those of China and America in this region.

"Pakistan's nuclear capability and the decision of its patrons in Washington to double the military aid package to Pakistan has drastically altered the balance of power on the sub-continent and we can ignore it only at our peril. All the friendly gestures of Pakistan are calculated to hoodwink us and lull us into complacency. Our gullibility should not be allowed to endanger the security and integrity of the nation."

Mr Tewary pointed out that "along with Pakistan, the situation in Sri Lanka with the involvement of the Americans, British, Israelis and Pakistanis is yet another threat to India's security from a traditionally safe side. The threat perception of Pakistan's nuclear bomb is an extension of coercive diplomacy and blackmail to which India is being subjected by the imperialist forces which are determined to destabilize our political system and dismember our country. In the present situation India has no option but to go into nuclear weapons and mobilize the masses to face the onslaught on the freedom and sovereignty of the nation."

/9274
CSO: 5150/0083

BRIEFS

U.S. TEST CRITICIZED--New Delhi, 24 Mar (AFP)--India on Monday criticized as "highly regrettable" the latest U.S. underground nuclear test. Foreign Minister Baliram Bhagat said in a brief reference during a debate on his ministry's budgetary demands in Parliament that the U.S. Government should heed international public opinion and reconsider its policy on this crucial issue. The underground test explosion was carried out in the Nevada desert Saturday. [Text] [Hong Kong AFP in English 1524 GMT 24 Mar 86 HK] /9274

JAPANESE FUSION DEVICE--Tokyo, 10 Mar--Under a contract signed recently with the Saha Institute of Nuclear Physics, a division of India's Department of Atomic Energy, the giant Toshiba Corporation will supply the Institute a Tokamak nuclear fusion device for experimental use. Under the terms of the contract, Toshiba will not only design and manufacture the fusion device but also supply capacitor banks, auxiliary equipment and technical service for the Tokamak device. It will be the first export of nuclear fusion equipment from Japan. Prior to undertaking the actual manufacturing work, Toshiba said it had built a scale model of the device in order to ensure that the best possible design and manufacturing technique were used. The main parameters of the Tokamak device are given as follows: major radius 300 mm, minor radius 75 mm and toroidal field 2 tesla. Toshiba said the Tokamak type fusion devices are expected to be the most feasible among various types of nuclear devices and they have been constructed and studied in leading industrialised countries such as the U.S., Japan, Western European countries and the Soviet Union. [Text] [Madras THE HINDU in English 11 Mar 86 p 5] /9274

CSO: 5150/0084

FORMER IAEA HEAD CITED ON NUCLEAR PROGRAM

BK060939 Karachi Domestic Service in English 1700 GMT 5 Apr 86

[M.I. Lashkar commentary]

[Text] Pakistan is a peace-loving country, and it cannot be anything contrary. So are peaceful purposes of its modest nuclear program. That is what is being emphasized by Pakistan, and that is what is being increasingly recognized by professional experts all over the world, in spite of the fact that certain quarters are questioning the peaceful nature of Pakistan's nuclear program for a political motive.

The latest such appreciation came from a person no less than the director general emeritus of International Atomic Energy Agency. Dr Sigvard Eklund, who headed the IAEA for 2 decades, categorically stated that Pakistan's nuclear system fulfilled the requirements of his agency for nonproliferation. Dr Eklund made the statement in Islamabad before leaving Pakistan last Monday [31 March] after a 5-day visit to the country during which he visited various nuclear installations and research centers in Pakistan.

Dr Eklund's professional view of Pakistan's nuclear objectives nullified the persistent misinterpretation about Pakistan's motive in acquiring nuclear know-how. Dr Eklund's remarks that additional safeguard conditions over and above those of his agency's which the Pakistani program fulfilled put by the supplier countries were being questioned in certain quarters also lends support to the view that the sustained propaganda campaign against Pakistan's nuclear program had been launched with ulterior motives. The propaganda and the suppliers' refusal on that account to supply spare parts for Pakistani installations have only impeded Pakistan's development in this particular area. But the motive is [words indistinct].

Dr Eklund, who lauded the achievements of Pakistan's Atomic Energy Commission in various fields, also recognized that the indigenous capacity and skill available in Pakistan acquire the nuclear option for application in the development process and said without cooperation from the developed countries Pakistan's nuclear achievements would merely be slowed down and would only take a longer period.

Indeed, Pakistan's energy gap is not the only reason for the country's nuclear program. The agricultural sectors which generate nearly one-third of our GNP have in some instances benefited immensely from the application of nuclear technology in the field. The extension of nuclear technology in the medical fields in the form of nuclear radiation and radioisotopes has proved its merits. And to any unbiased mind Pakistan's interest in the nuclear fuel cycle can only be based on technical and economic considerations.

It is Pakistan's consistent opposition to a vertical and horizontal proliferation of nuclear weapons that gives credibility to Pakistan's legitimate demand for access to a technology which is considered essential for modern-day progress.

/9274
CSO: 5100/4740

BRIEFS

PRC, PAKISTAN COOPERATION HINTED--The Defense Ministry's annual report for 1985-86 has said that Pakistan's determined quest for making a nuclear bomb and China's modernization program with military overtones have obvious bearing on India's security. The report says that China is widely believed to be involved in Pakistan's nuclear program. The continued flow of arms into Pakistan from the United States is another matter of serious concern to India. The ministry underlined the need for taking appropriate countermeasures in view of the fact that external forces could interact with internal forces of dissent in the political and socioeconomic spheres adding to our security problems. The report says there has been an increase in the number of contacts with China and bilateral relations between India and China have expanded in areas of trade and technical and cultural exchanges. [Text] [Delhi General Overseas Service in English 1330 GMT 31 Mar 86 BK] /6091

ZIA REITERATES PEACEFUL USE--The director general emeritus of the International Atomic Energy Agency [IAEA], Dr Sigvard Eklund, called on President Mohammad Ziaul Haq in Rawalpindi this evening and exchanged views with him on Pakistan's peaceful atomic program. The president reiterated Pakistan's intention to acquire atomic energy for peaceful purposes. He expressed the hope that the states with nuclear technology will understand Pakistan's immediate need for atomic energy and cooperate in this regard. The president agreed with Dr Eklund that the Agricultural and (?Biological) Atomic Institute in Peshawar has played a prominent role in achieving a better harvest this year in Pakistan. He also appreciated the progress in the medical field, with thousands of patients benefiting from new treatment methods. The IAEA director general emeritus said Pakistan (?badly) needs atomic energy for its development and is fully justified in its efforts to acquire such modern technology. Dr Eklund said he recognizes that Pakistan is reaping many benefits from its investment in atomic energy, such as in the fields of agriculture and medicine. Speaking at a news conference before his departure, he said IAEA will help in the development of atomic energy in Pakistan especially for generating electricity. [Text] [Karachi Domestic Service in Urdu 1500 GMT 31 Mar 86 BK] /6091

IMPROVED CHANCES FOR CHASHMA PLANT--Islamabad, March 11: In what is regarded as a very positive development Pakistan is reported to have at last succeeded in establishing its nuclear "innocence" in the international corridors of power. While a formal objection certificate is not expected to be issued by those who had in the past led an intense campaign against Pakistan's nuclear intentions it is, however, believed by knowledgeable circles that the country's efforts to establish a nuclear power plant now would, more likely than not, face no opposition any more. In the changed circumstances the chances of clinching a deal with foreign suppliers for the establishment Chashma nuclear power plant without having to sign the non-proliferation treaty (NPT) have brightened according to independent observers. Pakistan is said to have already received a number of offers in response to its tenders for the Chashma nuclear power plant issued about three years back. The most attractive of these offers are said to have come from Belgium and West Germany. Meanwhile France is reported to have offered a power plant as compensation for going back on the reprocessing plant agreement. According to informed sources, these offers are now said to be under consideration of the government. The one hitch in accepting the French offer is said to be the unhappy experience with this country over the reprocessing deal. [Text] [Karachi DAWN in English 12 Mar 86 p 1 GF] /9274

CSO: 5100/4738

SOUTH AFRICA

NUCLEAR RESEARCH FACILITY TO BE ESTABLISHED

MB251521 Johannesburg SAPA in English 1500 GMT 25 Mar 86

[Text] House of Assembly, Mar 25, SAPA — A proposed nuclear research facility to be established at the Gouritz River mouth between Mossel Bay and Port Elizabeth would be open to inspection by the International Atomic Energy Agency [IAEA] if IAEA guarantees were required, the minister of mineral and energy affairs, Mr Danie Steyn, said today.

Answering a question by Mr Roger Hulley (PFP [Progressive Federal Party] Constantia), Mr Steyn said no final decision had been taken on what sort of facility would be erected. Financial circumstances had delayed the project and at present only the infrastructure was being provided.

If the activities to be conducted at the facility were of such a nature that it required IAEA guarantees, the centre would be open to inspection by the agency.

Mr Steyn said an environmental impact assessment of the project had been carried out and studies were continuing in cooperation with consultants and universities. The results would be made available to the public when the studies were completed.

/9365
CSO: 5100/19

USSR

ISRAELI NUCLEAR PROGRAM, AMERICAN SUPPORT ASSAILED

Moscow GOLOS RODINY in Russian No 7, Feb 86 p 13

[Article by M. Puchkovskiy: "Israel and the bomb"]

[Text] Officially there are five states of the world which possess nuclear weapons: the Soviet Union, the U.S., the PRC, Great Britain and France. But there are zealous pretenders to the title of "nuclear" countries. These are Israel, the Republic of South Africa [RSA] and Pakistan. Despite all the differences between these states a common political denominator is clearly observed: they enjoy the protection of the U.S. which in relations with Israel and Pakistan is evident in openly military, economic and political support. They carry out a policy of state terrorism, using force or constantly threatening its use on their neighbors; they follow their own aims but at the same time are ready to fulfill the role of U.S. mercenaries in their own regions.

These circumstances make the nuclear ambitions of the Zionists, the Pakistani military establishment and the racists of South Africa particularly dangerous.

In November of 1984 Georgetown University published the results of its research on Israel's nuclear arsenal. According to this data, Tel Aviv today has at its disposal from 50 to 100 nuclear bombs. According to other American sources, the nuclear strike force of Israel is comparable to the nuclear capability of Great Britain at the end of the 70's.

How was this able to happen?

Each state, particularly a country with aggressive aspirations, and namely such a country as Israel, produces its own weapons under a cover of deep secrecy. But murder will out, particularly when such a "secret" is a nuclear bomb. Separate pieces of information testify to how the Israeli nuclear tumor grew.

In the 1950's, Chaim Weizman, a world-renowned chemist, convinced then Israeli prime minister Ben-Gurion that Israel was "an island in a sea of Arabs" and that nuclear weapons were necessary in order to subordinate this "sea". The first help was received from France, which had just started creating its own "independent nuclear forces". The French needed to carry out a number of complicated calculations, but the U.S. refused to sell them computers. Then Tel Aviv promised to carry out the necessary calculations on the newest American-made computers, which the Weizman Institute had. In exchange an experimental nuclear reactor for the production of plutonium was received from the French. The French firm Saint-Gobens Technique Nouvelle installed it at the Israeli nuclear center in the Negev desert.

With the accession to power in France of General de Gaulle this cooperation came to an end but a secret supply of uranium to Israel had already been arranged. In December 1968 Europe was struck by a mysterious disappearance of 299 tons of uranium ore from the ship "Sheysberg". The secret services of several West European countries established that this "pickpocket theft" involved the Israeli intelligence service Mossad.

This amount of raw material was enough for 130-150 kilograms of plutonium but the military men in Tel Aviv did not want to wait. The next loss of a certain amount of pure plutonium now occurred in the U.S. tracks led to Israel but President Johnson ordered the CIA director to stop the investigation.

Thus at the end of the 1960's Israel had everything necessary for production of first generation nuclear weapons. Now its concern is for keeping its monopoly in the Middle East. On 7 June 1981 Israel aircraft destroyed in a sudden strike an Iraqi nuclear reactor in Baghdad, received by Iraq also from France. Two years earlier in Marseilles Israeli saboteurs blew up the components parts of a nuclear reactor which the French were preparing for shipment to Iraq.

For testing the activity of "production" Israeli experts were permitted to observe French experimental explosions in the Sahara. In addition, the explosion in South Africa, which was detected by an American satellite in September 1979, according to information of specialists, was an explosion of an Israeli nuclear bomb.

Thanks to its close contacts with a group of American theorteticisans and technologists in nuclear physics, Israel achieved further improvement in its nuclear weapons. In the U.S. they make no big secret of the pro-Zionist sentiments of "the father of the atom bomb" Edward Teller and several young scientists who in the last 15 years have been connected with Israel by a multitude of open and secret ties.

Israel's dependence on military and economic aid of the U.S. increases in proportion to its ambitions in the Middle East. Its military self-confidence as possessor of an atom bomb strengthens its foreign policy adventurism and the threat of its role as "detonator" country and its readiness to follow the dangerous course of the United States.

That is why Israel declines with such constancy the peaceful initiatives of the Soviet Union. That is why it was one of the first who supported the American plan of "star wars" and expressed readiness to participate in every possible way (although, of course, not selflessly) in joint development of space weapons.

CSO: 5100/12

NEW NUCLEAR PLANTS PLANNED

The Hague ANP NEWS BULLETIN in English 3 Mar 86 p 6

[Text] The Hague, March 3--Economics Minister Fijs van Aardenne has poured cold water on a report which says the Netherlands could save billions of guilders by dropping plans to build two new nuclear power plants.

The report, published on Saturday by Groningen University researchers, said that in the year 2000 it would cost up to 800 million guilders less to meet the nation's electricity needs if the plants are not built.

The researchers assumed an oil price in the year 2000 of 22 U.S. dollars per barrel and an exchange rate for the dollar of 2.75 guilders.

The report was commissioned by a Dutch environmental group which opposes the expansion of Dutch nuclear power capacity.

Commenting on the report in a Dutch radio interview on Saturday, Van Aardenne said the assumption that oil prices would remain low was too optimistic.

Labour Opposition

He said he stood by government plans to have two new nuclear power plants in operation by 1995 and that the Netherlands should aim in the long term to generate 40 percent of its electricity in such plants.

The government decided in January 1985 that at least two new nuclear power plants, each with a capacity of between 900 and 1,300 megawatts, should be built by the year 2000.

The main opposition Labour party opposes expansion of nuclear generating capacity and wants the existing small nuclear plants of 450 MW at Borssele and 50 MW at Dodewaard to close.

The two plants currently supply some six percent of the electricity generated in the Netherlands.

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CSO: 5100/2517 END

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19 MAY 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

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CANADA

PROTEST DISRUPTS ANNOUNCEMENT OF NUCLEAR DEAL WITH U.S.

Toronto THE GLOBE AND MAIL in English 24 Mar 86 p A4

[Text] WINNIPEG

A news conference to announce the signing of an $81-million nuclear waste research agreement with the United States was disrupted when about 20 anti-nuclear protesters peppered federal Health Minister Jake Epp with questions.

The conference came to an abrupt end on Saturday after organizers realized they could not silence the demonstrators, some of whom arrived with young children.

Demonstrator Donovan Timmers, whose group fears Manitoba is slated to become the site of a nuclear waste dump, told the minister "you haven't given us any reason to trust what you say."

Mr. Timmers also said the accord violates a promise from the Manitoba Government that there would be extensive public consultation before major alterations are carried out to Atomic Energy Ltd. of Canada's nuclear waste disposal research laboratory in Manitoba.

Mr. Epp praised the deal, saying there is a need to develop good technology to dispose of hazardous materials.

Under the accord, the United States will spend $22.4-million in Canada and another $10.2-million on research in the United States. Canada will have full access to the research.

The remaining $48.5-million represents the contribution from AECL.

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CSO: 5120/33

CANADA

REASSURANCE GIVEN ON NUCLEAR WASTE SITE SELECTION

Windsor THE WINDSOR STAR in English 1 Apr 86 p A4

[Text]

FREDERICTON (CP) — The fears of Maine and New Brunswick residents over the selection as early as this summer of a site in Maine for disposal of nuclear waste are groundless, says a local physicist.

Stanton Friedman said in an interview Monday a final choice for an American nuclear waste depository will not be made until 1998.

A nuclear waste depository could be opened by 2008, he said, depending on approval from the U.S. Congress and upon completion of involved and costly environmental impact studies.

A group of Maine and New Brunswick residents have joined forces to prevent a nuclear waste facility being established in Maine. The groups fear a site at Bottle Lake, about 40 km (25 miles) west of St. Stephen, N.B., will be chosen in July.

But Friedman said there hasn't been any indication the Bottle Lake site is high or low on the list of 12 potential sites in the eastern U.S.

He said the 4,900-hectare (12,000-acre) site is the second smallest recommended and it is among the most remote from nuclear plants and industries.

Friedman also took issue with the contention the U.S. government, by the year 2000, needs a facility able to handle 70,000 tons of radioactive waste, including 10,500 tons of weapons-grade plutonium.

He said industry sources indicate only 300 tons of weapons-grade plutonium had been produced by 1982. In any case, he said no weapons-grade plutonium will be stored in the depository.

HE ALSO disputed reports the New Brunswick government probably considers Bottle Lake a convenient place for Point Lepreau radioactive waste, currently stored in large deep-water tanks on the site of the New Brunswick nuclear power plant.

Friedman said there aren't any plans to store Canadian radioactive waste in the United States, but there are plans to store Point Lepreau waste in Ontario.

The United States plans to store nuclear waste in casks costing $1 million each, he said. The casks, consisting of a steel liner surrounded by dense metal casing and a steel shell, are designed to withstand puncture, heavy impact and water.

The depository will consist of deep shafts carved out of stable crystalline rock formations, many of which happen to be found in the eastern U.S., he said.

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CSO: 5120/34

DOORS TO QUEBEC'S GENTILLY ONE POWER PLANT TO BE SEALED

Ottawa THE CITIZEN in English 21 Mar 86 p C25

[Text] TROIS-RIVIERES (CP) — Seven years after Atomic Energy of Canada Ltd. was forced to take Quebec's first nuclear power station temporarily out of service, company officials are finally turning the plant into a concrete tomb.

The doors to the trouble-plagued Gentilly 1 power plant will be sealed next month and the maintenance costs AECL has been paying since 1979 for the partly dismantled plant will drop to $500,000 a year from $10 million.

Inside the concrete tomb, whose walls are one metre thick, is the radioactive carcass of an experimental, commercial-sized nuclear reactor that cost $88 million to build in the late 1960s.

The plant was started up in 1970, ran intermittently for less than 200 days and was temporarily shut down for safety reasons in 1979.

Gentilly 1 is one of the first nuclear power plants of its size in the world to be even partially dismantled or decommissioned. AECL officials believe they can turn the loss of the plant into an advantage by marketing expertise they acquired during the $25-million shutdown.

"Our intention is to market our decommissioning know-how and create jobs for Canadians," said Joel Liederman, general manager for AECL's CANDU operations in Montreal.

But the competition for decommissioning services will be stiff because most countries prefer to develop their own expertise.

One of the biggest markets AECL hopes to penetrate is the United States, which has several reactors that are nearing the end of their lives and will need to be decommissioned, he added.

The dismantling operation at Gentilly 1 has already attracted the interest of nuclear experts. Last week, AECL hosted a workshop in Montreal on decommissioning for nuclear industry executives from Britain, France, the United States, Japan, West Germany and Italy.

Gordon Edwards, president of the Canadian Coalition for Nuclear Responsibility, says he's delighted that the Crown corporation has decided to close Gentilly 1, which he calls AECL's worst failure.

"Every time they started it up it would trigger its safety systems and shut itself down," said Edwards.

Other problems developed when the Atomic Energy Control Board, which regulates the nuclear industry in Canada, demanded that AECL shut down Gentilly 1 until new safety equipment was installed. That would have cost $120 million.

The final blow came when Hydro-Quebec decided in 1981 not to buy the plant. Gentilly 1 is built on property owned by the provincial utility, which was contracted to operate the plant.

Although Gentilly 1 shut down in 1979, more than 200 Hydro-Quebec employees remained posted there for security and maintenance until May 1984. AECL signed the paycheques.

Liederman said that it wasn't worth revamping Gentilly 1 with all the surplus hydro power in Quebec.

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CSO: 5120/33

CANADA

ONTARIO'S ROLPHTON DEMONSTRATION STATION GIVEN REPRIEVE

Ottawa THE CITIZEN in English 26 Mar 86 p C3

[Article by Carell Johnson]

[Text] ROLPHTON — Ontario Hydro and Atomic Energy of Canada Ltd. have reversed an earlier decision and agreed to keep the Rolphton Nuclear Power Demonstration station here open for at least three years.

Representatives of the two bodies, joint owners of the 24-year-old reactor, announced Tuesday the station will continue to operate until 1989.

The fate of the increasingly out-of-date station is to be re-evaluated in 1988.

"We have decided to keep (the station) open because we can still benefit from it," said Ontario Hydro chairman Tom Campbell.

The 25-kilowatt station near here, 225 kilometres northwest of Ottawa, has 213 employees. It was built in 1962 to train employees and demonstrate CANDU nuclear-reactor technology.

Last year, the training program was moved to southern Ontario. The station's usefulness has become limited because its design is different from Hydro's 16 other reactors. The station costs $8 million annually to operate.

But the demonstration station is the oldest CANDU reactor, nine years older than any commercial unit.

James Donnelly, Atomic Energy of Canada president, says its age gives it "value in providing information about CANDU's durability."

Sean Conway, MPP for Renfrew North, also credits local protests as a key factor in the decision to keep the operation going.

"It was only because the community spoke out clearly and strongly that the Hydro board reacted this way."

Deep River Mayor Lyall Smith, active in the campaign to save the station, was delighted by Tuesday's announcement.

"It will allow for some stability. But the real work now begins. We have to find an alternate related use for the site," he said.

In delegations to Ontario Hydro officials in Toronto, local politicians and business representatives argued shutting down the reactor would severely damage the area's economy, which already is suffering from other setbacks.

After federal financing cuts in May, 250 jobs were eliminated at the Chalk River research site of Atomic Energy of Canada, the largest employer in the region.

In 1985, Ontario Hydro closed the Rolphton Nuclear Training School, cutting 100 permanent jobs.

In February, the Ontario Hydro employees union organized a rally in Deep River to save the station.

Union officials said the reactor's employees found the station's annual viability review hard on the nerves and asked for a commitment to keep the reactor open for more than one year.

If a shutdown had been ordered, all reactor staff would have been offered jobs at other Ontario Hydro sites. But some do not want to move.

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CSO: 5120/33

CANADA

RADIOACTIVE FUEL RODS MISSING IN DAMAGED HYDRO REACTOR

Toronto THE TORONTO STAR in English 3 Apr 86 p A13

[Article by William Walker]

[Text] Ontario Hydro engineers are on a delicate hunt for deadly, radioactive fuel rods that have become lodged somewhere inside a damaged nuclear reactor at the Bruce power station near Kincardine.

The loss of the fuel rods is a repeat of a 1983 occurrence at the Pickering nuclear reactor, where two fuel rods went missing in a similar accident.

At Pickering, Hydro eventually was forced into a three-year shutdown of the reactor, which will cost the utility $1 billion.

The Bruce unit reactor will be shut down for at least a month, and possibly longer, forcing substantial, but as yet uncalculated, costs in replacement coal-fired power.

And Hydro officials now say tests may be required to determine whether the accident is an indication of weakening tubing inside the normally reliable reactor, which was first started in 1976.

Weakened tubing at Pickering prompted Hydro to replace all the tubes in two reactors.

A solemn Arvo Niitenberg, Hydro vice-president, announced to the government's select committee on energy yesterday that 6½ fuel rods were missing at Bruce.

Coolant leak

The accident, the first of its kind at the station, occurred last weekend when a pressure tube holding the fuel rods split open, causing the leak.

Niitenberg was asked by concerned MPPs on the committee for an update on the Bruce accident, which caused 10 tonnes of heavy water coolant to leak inside the reactor.

It is believed that at the time of the rupture, the fuel rods were shot out of the pressure tube and landed somewhere inside the reactor. At first, 8½ fuel rods were missing, but Hydro was able to locate two that had fallen into a storage bay containing spent fuel.

Hydro has repeatedly stated that no radioactive material has leaked outside the reactor and that the accident has caused no danger to the public or to Hydro staff.

Mike Williams, a Hydro spokesman, said officials are preparing to drop a remote-controlled camera inside the Bruce reactor in a bid to find the missing fuel rods.

No humans could venture inside to search because the rods are extremely radioactive and deadly to human touch within seconds.

Hydro must be extremely careful in locating the fuel rods, one official warned yesterday.

"Obviously, anything that hot (radioactive) gives off a considerable radiation field."

Each pencil-like fuel rod contains pellets of highly radioactive uranium fuel. The rods are bundled like toothpicks into groups of 37 and laid end-to-end inside the pressure tube. The bundles of fuel are about 50 centimetres (19 inches) long.

Each pressure tube holds 13 bundles laid end-to-end, and with 480 pressure tubes in a reactor, there are a total of 230,880 fuel rods.

Because Hydro has not yet been able to get the camera inside the troubled reactor, it is not known how large the rupture in one pressure tube is.

Replace calandria

But Williams said yesterday that it is thought to be "several bundles long," based on the amount of heavy water that leaked.

At the very least, Williams said, Hydro will be forced to replace the damaged pressure tube and another tube that surrounds it, called the calandria.

At Pickering three years ago, a pressure tube ruptured inside the Unit 2 reactor and two fuel rods went missing.

The pressure tube was found to have ruptured after several "garter springs," intended to separate tubes, had slipped out of place over several years and caused the aging metal tubes to scrape against each other.

Williams said recent tests at Bruce on the Unit 2 reactor showed that over the past 10 years, the garter springs had also slipped out of place.

At Pickering, tests on several other pressure tubes after the 1983 accident prompted Hydro to replace all the tubes. But the tubes inside the Bruce reactor are made of what Hydro believes is a stronger metal than an alloy used at Pickering.

Williams said the damaged tube from Bruce will be tested in a laboratory by metallurgists before Hydro decides whether to test other tubes within the same reactor for widespread weaknesses.

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CSO: 5120/34

CANADA

COMMITTEE HOLDS HEARINGS ON DARLINGTON COMPLETION

Ontario Hydro Chairman

Toronto THE TORONTO STAR in English 3 Apr 86 p A13

[Article by William Walker]

[Text]

Ontario Hydro chairman Tom Campbell has pleaded with a government committee to avoid the possibility of power shortages that could result from cancellation of part of the Darlington nuclear station.

Campbell, in an opening address before the select committee on energy, which is holding hearings at Queen's Park, made an obvious reference to the committee's ultimate purpose — deciding whether to complete the $11 billion Darlington station.

"I would make a special plea to the committee," Campbell said.

"The flexibility of our system must never be compromised. None of us, not at Hydro or in government, will be pardoned if we take decisions in the next few years that cut supply and cause power shortages."

He also warned that thousands of jobs in Ontario could be lost if Hydro is not able to provide reliable electricity to industry.

Campbell's testimony began two full days of Hydro submissions. The utility is concentrating on a supply-and-demand study for the late 1990s and beyond — under the assumption that Darlington will be completed as planned by 1992.

"Completion of Darlington is essential as part of the system required to be in place to meet the needs of the 1990s," Campbell said.

He added that Darlington — which critics say is unnecessary and will only add to Hydro's $24 billion debt — will help attract investment in the Ontario economy and create jobs.

But the committee, in an interim report, has already expressed skepticism about the need for two of four reactors at Darlington. And it has ordered no new construction contracts to be signed until after the hearing.

Continuing what critics have tabbed Hydro's "more is better theory," Campbell yesterday argued that if Ontario produces more electricity, its economy will benefit.

Other Hydro Officials

Toronto THE TORONTO STAR in English 4 Apr 86 p A10

[Text]

Ontario Hydro says nuclear power is the most economical and reliable source of electricity, but has asked the province whether it is willing to spend more money to find alternative sources of power.

Testifying before the Legislature's select committee on energy, Hydro officials yesterday explored all the power supply options available, aside from building new generating stations powered by coal or nuclear energy.

Hydro asked the MPP's to consider how much extra money might be available to develop a new hydraulic power plant, to purchase power from Manitoba or Quebec, or to develop small alternative technologies such as wind, wood or solar power.

The submissions ended two full days of presentations by the utility, featuring slide shows, a movie and several volumes of material prepared by Hydro researchers.

Hydro has told the committee that it is studying power requirements for the late 1990s and beyond, under the assumption that the $11 billion Darlington nuclear station near Oshawa will be completed early in the next decade.

The utility has agreed to look at alternative sources of electricity in the future and to try to reduce demand for power through conservation methods.

The all-party committee's purpose is to decide whether Darlington should, in fact, be completed at all.

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CSO: 5120/34

ONTARIO HYDRO NEGOTIATING URANIUM PRICE, MAY SELL TRITIUM

Goal of Price Cuts

Toronto THE GLOBE AND MAIL in English 3 Apr 86 p A9

[Article by Robert Sheppard]

[Text] Ontario Hydro is threatening to sever a longstanding contract with one of its main uranium suppliers — a mainstay of the northern mining town of Elliot Lake — unless substantial price cuts can be negotiated, the head of the utility said yesterday.

Hydro chairman Thomas Campbell told a committee of the Legislature that for the past several months the utility has been negotiating price and production cuts with Rio Algom Ltd. of Toronto, now that the eight-year-old contract has reached the stage where it is open for cancellation.

Hydro has already exercised some of the cancellation provisions in the contract because it can buy uranium more cheaply from Saskatchewan, he said.

At the same time, he said in an interview after the committee appearance, Hydro is mindful of "the human dimension (of the problem) and wants to be a good corporate citizen. ... We would prefer to get the price down and still keep Elliot Lake a viable community."

Mr. Campbell said that he expects to conclude the negotiations with Rio Algom before the summer and then turn the matter over to the provincial Cabinet to decide.

He also suggested that if the Government does not give full endorsement to construction of all four phases of the new nuclear plant at Darlington, then that "would complicate matters" because much less nuclear fuel would be required over the longer term. Existing contracts had been based on grander projections.

So far, the Liberal Cabinet has not given Hydro the go-ahead to complete Darlington, but it has asked the Crown corporation to agree to abide by a legislative committee report that non-essential construction be held back during this period of re-evaluation.

Mr. Campbell said Ontario requires the full nuclear capability of Darlington if it is to remain attractive to potential investors. Hydro is going along with the Government request but the matter is largely academic because 80 per cent of the work, at least on the first two stages, has already been contracted out, he said.

At Rio Algom, senior officials acknowledged that there have been discussions with Hydro but would not talk about them in detail.

Even if that clause is exercised, which appears unlikely given the political fallout such a move would have in Northern Ontario, Hydro would still have to give five years notice before it could actually stop delivery of the Elliot Lake uranium.

Rio Algom is one of three main suppliers to Hydro. Its Elliot Lake mine, which exports most of its uranium to other countries, is still relatively dependent on the provincial utility. An estimated 20 per cent of Rio Algom production goes to Hydro, and that share had been forecast to increase substantially through the nineties under the terms of the existing contract.

In recent years, however, the utility has been buying about one-third of its uranium from Saskatchewan where the ore is of a better grade and mined more cheaply near the surface.

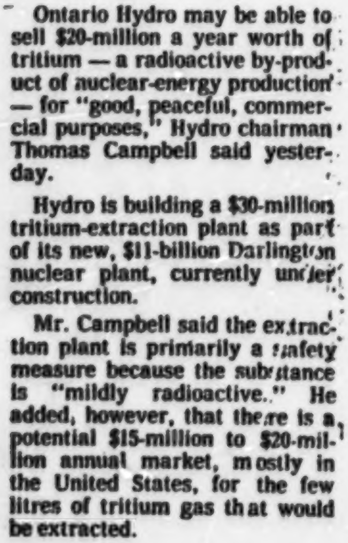
A second Ontario contract with Denison Mines Ltd. of Toronto would reach its cancellation phase in about four years and "many of the same arguments will be around again," Mr. Campbell noted.

However, there is a financial penalty to cancelling the contracts. Under the terms of the Elliot Lake agreements, both Denison and Rio Algom receive the cost of production plus a guaranteed profit, which is indexed to rise through the eighties and nineties.

Tritium Sale Possibility

Toronto THE GLOBE AND MAIL in English 3 Apr 86 p A9

[Text]



Ontario Hydro may be able to sell $20-million a year worth of tritium — a radioactive by-product of nuclear-energy production — for "good, peaceful, commercial purposes," Hydro chairman Thomas Campbell said yesterday.

Hydro is building a $30-million tritium-extraction plant as part of its new, $11-billion Darlington nuclear plant, currently under construction.

Mr. Campbell said the extraction plant is primarily a safety measure because the substance is "mildly radioactive." He added, however, that there is a potential $15-million to $20-million annual market, mostly in the United States, for the few litres of tritium gas that would be extracted.

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CSO: 5120/34

PLANS FOR DEVELOPMENT OF NUCLEAR POWER SOURCES IN CEMA COUNTRIES

Controllable Thermonuclear Synthesis

Sofia RABOTNICHESKO DELO in Bulgarian 24 Jan 86 p 4

[Article by Vasil Khristov, Institute of Nuclear Research and Nuclear Power at the Bulgarian Academy of Sciences: "The Inexhaustible Atom"]

[Text] Last December the forty-first extraordinary session of the Council for Economic Mutual Assistance approved the complex programm for scientific and technical progress of the member countries of CEMA upto the year 2000. One of the five major directions of the program is the accelerated development of atomic energy.

Research in this direction is connected to the future completion and introduction of atomic power stations with water-cooled reactors with thermal neutrons -- WCNPR (water-cooled nuclear power reactor) 440 and WCNPR 1000, upon which the nuclear power of the member countries of CEMA is now being built. The issues are resolved with the creation of atomic thermoelectric power plants and atomic plants for heating supplies, high temperature nuclear power technology systems with fast breeding characteristics, and fast neutron breeder-reactors. The program also provides for joint research on one of the most interesting problems of the future supply of power -- the creation of scientific principles of controllable thermonuclear synthesis. That which, just 5 to 10 years ago, seemed like a dream, a problem for the next century, is now a difficult, but actually feasible scientific and technical task.

The Hot Breath of Plasma. The successes of Soviet science and technology in the sphere of atomic energy have given her an advanced position in the world. At the Kurchatov Institute of Atomic Energy the first thermonuclear structures named TOKAMAK (toroidal chamber with a magnetic spool) were created, in which close-to-desirable parameters were achieved and the feasibility of controllable thermonuclear synthesis was demonstrated in principle.

Gaseous nuclear fuel -- a mixture of deuterium and tritium (heavy hydrogen isotopes) is injected into the chamber, which is shaped like a closed finger, of a cylindrical vaccum tube (a round pretzel). In order for their nuclei to fuse, whereupon large amounts of energy are discharged, the gaseous mixture must be brought to the state of high-temperature plasma and is heated to a temperature of approximately 100 million degrees. This is why the synthesis is called thermonuclear. In order to isolate the hot plasma from the walls of the chamber, a strong magnetic field is created with the aid of spools. In this way, the magnetic field constricts the plasma contained in the chamber in the form of a plasma flex, not touching the walls. The gaseous mixture heats up with the aid of their electrical impulses which reach several million amperes.

This illustration of the essence of controllable the thermonuclear process is much simplified, of course. It can be defined more precisely if we indicate theprojected parameters of the new system TOKAMAK-15. In the first demonstration of the thermonuclear structure, the temperature of the plasma is expected to reach 70 to 100 million degrees, at electrical impulses of 1.8 million amperes and a retention time of 0.2 to 0.3 seconds for the plasma. The chamber will have a cross-section diameter of 4.6 meters and a plasma flex diameter of 1.5 meters.

Draft plans are being developed for the first experimental thermonuclear reactor (ETR). These plans provide for a uranium blanket for the ETR, in which up to 150 kg of plutonium per year will be produced. Its electric power will reach 100 thousand kilowatts. At the moment, there are approximately 100 TOKAMAK thermonuclear installations in use in the world. Other methods of thermonuclear synthesis are being developed, for example using lasers to heat the plasma.

The International Agency for Atomic Energy recently adopted the suggestion of Soviet scientists for the joint development, equipment and exploitation of one of the largest thermonuclear structures, called INTOR. At present an international group of physicians from the USSR, the USA, Japan and other western countries are working on this project. This is the right way to direct the efforts of all countries toward the important problems of the peaceful use of atomic power, toward ensuring lasting peace in the world.

Water -- The Source of Power. Cooperation between the member countries of CEMA in this sphere began as early as 1978 on the initiative of the Soviet Union. The bilateral scientific and technical cooperation between the Institute of Nuclear Research and Nuclear Power at the Bulgarian Academy of Sciences and the Kurchatov Institute of Atomic Power includes joint research into neutron physical characterists of materials used in the blanket (the area which houses the plasma) and biological defense of thermonuclear reactors. We are also developing spectral methods and devices for plasma diagnostics. At our institute, theoretical research is going on into muon catalysis (the elementary mesotron particles provoke accelerated thermonuclear reaction with the nucleus of deuterium at room temperature). This is a new and promising method which could find a practical application in the more distant future when it is possible to create thermonuclear structure with a mesotron factory (a powerful source of mesotron.

For now, only the thermonuclear reaction between the nuclei of deuterium and tritium is feasible. Although tritium does not naturally exist in a free state, it can be produced from lithium in a blanket when irradiated with neutrons which the thermonuclear plasma emits. The first thermonuclear reactors will probably be hybrid systems for synthesizing and splitting the nuclei. In the reproduction zone, uranium or thorium isotopes are inserted from which, as a result of their splitting, additional amounts of nuclear power are yielded and secondary nuclear fuel is produced -- plutonium 239 and uranium 233.

In order to move on to the next stage -- thermonuclear synthesis of only the deuterium nuclei, many scientific and technical problems have to be resolved. Because ten times greater parameters of plasma are needed for the practical realization of this synthesis. The prospects for the practical realization of thermonuclear reaction of this type are particularly attractive, since in every liter of water there are 37 mg of deuterium which can easily be extracted. The power equivalent of this amount of deuterium can be compared to approximately 300 liters of benzine. In this way, the thermonuclear "heating" of water will be transformed into a practical, inexhaustible source of power. This will open up colossal possibilities for scientific and technical progress of unending advances in the economic and cultural development of the whole of mankind.

Project for a Laser Reactor

Sofia RABOTNICHESKO DELO in Bulgarian 24 Jan 86 p 4

[Journal announcement]

[Text] As Professor Vasil Khristov's article was going to press, we received an announcement in the editorial office. It bears directly on the information concerning the future development of controllable thermonuclear synthesis which is contained in the article.

Soviet scientists have suggested a solution to the problem of controllable thermonuclear reaction with a thermonuclear reactor in which plasma is heated by a laser beam. The design is being produced at the Moscow Physics Institute under the leadership of Academician Nikolay Basov. At the basis of the new plan is a spherical reactor with the power of one hundred million kilowatts. Not incidentally, the globe has been chosen as the form of the vacuum chamber. The target, placed just in the center, can most evenly be irradiated by lasers.

Research is being conducted in the Delfin thermonuclear laser system and interesting results have been produced. The temperature of the thermonuclear plasma has reached twenty-five million degrees, and this allows an intense emission of thermonuclear reaction to be achieved.

One of the directions in the resolution of the problems of thermonuclear synthesis is the method of heating the fuel mixture by laser. If the temperature reaches the optimum level, one billionth of a second will be enough to ignite the mixture.

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GROWING OPPOSITION TO NUCLEAR POWER PLANTS DISCUSSED

Zagreb DANAS in Serbo-Croatian 4 Mar 86 pp 9-11

[Article by Ratko Boskovic: "Fusion Without Fission"; first paragraph is DANAS introduction]

[Text] The public discussion about building nuclear power plants in our country has both voluble opponents (ecologists who like neither discussion nor nuclear power plants) and advocates who base their demand on the fear of new uncontrolled borrowing and on technological dependence. In this case, however, public discussion has been envisaged even by law, but the question is whether all the necessary elements have been brought about for that discussion.

Opposition to the Yugoslav program for nuclear power development has occurred in public in recent days with the suddenness and ferocity of an eruption in the very middle of the period envisaged for gathering foreign and domestic bids for the transfer of technology and for construction of the Prevlaka NE and along with it a new series of four nuclear power plants in all which would presumably begin to generate power at the end of this century and the beginning of the next one.

However, it is not just a question of opposing the nuclear program. The manner and time in which the discussion was opened and also the demands which have been presented in it constitute a new sociopolitical phenomenon which actually did not begin with the nuclear power plants, nor does it intend to stop with them. At the very outset of the discussion, which seems to have surprised everyone and which will certainly escalate in the days to come, the statements about nuclear power are only a medium for much broader political goals than the desire to start a debate about electric power stations, and many high tensions that have built up in Yugoslav society are discharging and springing up. We believe that in the discussion to come it will not always be easy to recognize them, which is why we will attempt to survey them at least superficially.

Antinuclear Sentiment and the Ecologists. There is no longer doubt that a very strong antinuclear disposition has grown up in Yugoslavia within the framework of an altogether new ecologistic movement. As with any such movement, its aims go beyond ecology. This is evident from the very vocabulary which it uses and which is without precedent in Yugoslavia: In the discussions of the Plomin TE the electric power industry has already been referred to as the "electric power Mafia" and an "alienated power center"; the possibility of demonstrations at the site where a power station is being built has been openly mentioned throughout an entire region for what is the first time as far as we know.

On 23 February NIN added new terms to that arsenal: "electrofascism, nuclear madness, the new despotism...the observations are recognizable even in these nuclear situations (troubles) of our own...." And further: "The public is slowly waking up and is more and more placing belief in its own layman's intelligence."

Why should it wake up precisely over the question of building nuclear power plants, and can it be that in a socialist country there are no other channels for showing vigilance? Clearly it is not a question just of nuclear affairs, nor is the Green Movement a phenomenon exclusive to the Western countries: In Hungary, according to THE ECONOMIST on 8 February, that same day the Hungarian /independent ecological movement/ (emphasis [represented by slantlines] supplied by the author) Duna Kor (the Danube circle) planned a march through Budapest in order to protest construction of the Czechoslovak-Hungarian dam at Nagymaros, which, in the assessments of Hungarian and West European ecologists, would cause irreparable damage to the environment in central Europe....

Electric Power Industry and the Public. "Even our own advocates of building nuclear power plants would like to do their job out of the public eye," it has been said in a newspaper article. In short, the procedure which preceded the international invitation for bids was as follows.... The Executive Councils of Slovenia and Croatia agreed on construction of Prevlaka and on setting aside the money necessary back in early 1982, when the preparations for construction also had to begin. Space for Prevlaka was reserved in the debates in the Croatian Parliament in October and November 1983. Even that step was preceded by several extensive studies into the acceptability of a site not far from Zagreb (the major power consumer), and those studies survived the discussions by all the competent self-management and administrative bodies.

In order to advertise the international competition five republics and the Province of Vojvodina signed a self-management accord; in the context of the agreement on long-range development of Yugoslavia's nuclear power all the republics and provinces came to agreement and signed and published the Social Compact on Uniform Procedure for Selection of the Nuclear Fuel Cycle and the rest. All the republics and the federal atomic commissions and governments gave their consent to the invitation for bids.

Three consortiums were also formed: JUMEL, an association of producers of nuclear equipment, "4E," a consortium of Yugoslav project planning organizations, and NUKLIN, an association of nuclear institutes and scientific institutions. A virtual mound of documents were drawn up, and they all went through reviews by domestic specialists at all levels and also specialists of the International Atomic Agency. Unless all those bodies were operating on their own hook without consulting their own constituency and councils and the specialized circles they rely on, it can by no means be said that things were done in secret. What is more, it is more likely that there is not a single specialist in nuclear power or related fields in Yugoslavia who was not involved in organizing preparations for construction of the nuclear power plants.

The demands for a general referendum, then, may be an expression of a lack of confidence in establishment of decisionmaking procedure, a lack of confidence in all those commissions, committees, institutions, and governments. Or the demand for a referendum is at the same time a desire for satisfaction in repayment for those days of euphoric government investment when public opposition--in the youth press, for example--ended up with action taken by prosecutors and courts? Or the result of an assessment that the time of government investment has not gone by at all?

It is difficult to say. In any case, the public discussion is welcome, although it is hard to believe that anything will come out of it that has not already been applied in the 40 years of experience in work with nuclear power plants in the world. It will be a splendid result if only public supervision is established over the process as to whether what is known in the world is fully applied or not.

Certain prerequisites are necessary for this kind of public discussion and indeed also for any referendum that might possibly follow from it. First of all, the electric power industry must inform and teach the public about power engineering in an essentially better way. This cannot be done with unreadable and altogether incomprehensible "material" presented for public discussion; this cannot be done without professional public relations departments. Another necessary prerequisite for a constructive referendum is an opportunity to examine the secrets, an opportunity for a pluralism of nuclear interests to be expressed in media which do not arise solely out of the differing interests of the republics and provinces.

In any case, the public discussion has been prescribed by law. Under the Law on Ionizing Radiation and the law on approval of construction of projects like a nuclear power plant, obtaining what is referred to as the site permit requires proving under 13 topic headings that a nuclear power plant at the particular site will not endanger the environment, the population in the vicinity, and the existing infrastructure. Accordingly, the public discussion cannot be omitted, even if someone wanted to do so, but that kind of discussion must be organized at the point when all the necessary elements for it exist.

Water, Coal, Petroleum, Solar. The most up-to-date knowledge about coal deposits in Yugoslavia states that at the present rate of consumption the geological reserves are sufficient for the next 250 years. Coal, then, it is asserted, might be our "bridge to the future," an inexpensive source of energy with which we might calmly await commencement of the commercial use of nuclear fusion. To fusion, then, without passing through fission. Even now it is known that fast-breeder reactors in the first commercial series will cost twice as much as conventional reactors, and nothing can be said about fusion reactors, since they are still generating power only in theory. Accordingly, if at this point Yugoslavia is not economically capable of building conventional nuclear power plants, how is it going to take the one or two quantum jumps in economics, knowledge, and experience in the use of nuclear technology to reach the new generations of nuclear power plants?

Hydroelectric potential rated at about 20 million kwh of power per year is still unutilized in Yugoslavia. In Croatia about half of the hydro potential is also unused--but that is the "half that was left over": there is room for a number of quite small hydroplants, mainly run-of-river, the more expensive and uneconomical half which is precisely a reserve and is waiting for that level of power rates at which its exploitation will pay off.

There is no sense at all in speaking in this context about the sun and the wind--or in fact about oil and gas, since these sources cannot satisfy more than a certain percentage of energy needs, and the power which they can supply is many times more expensive than the power from conventional sources.

Power Demand and Supply. During the last two medium-term periods power consumption in Yugoslavia has increased faster than production. Nor will it be possible to halt this lag in the near future, so that by the end of the century the electric power industry is forced to plan shortages instead of surpluses and reliable supply of power. According to the plan, by the year 1990 power consumption in Yugoslavia should increase 5 percent, and production 4.9 percent. At the end of the decade there would be an annual shortage of 2.5 billion kwh assuming that the plans are fulfilled--which has never happened yet. Croatia is among the republics which are planning larger production and consumption, but production is possible--if we exclude the Prevlaka Nuclear Power Plant and the Plomin Hydroplant--only on the territory of other republics and provinces.

Distrust of the Scientists. "It was a bit unexpected," BORBA reported on 23 February concerning the discussion in the LCY Central Committee, "when in the debate about the scientific revolution Dr Dragisa Ivanovic, professor, raised the question of building the new nuclear power plants in the country, emphasizing first of all that 'it must not be allowed to become a noose around Yugoslavia's neck.'..." Prof D. Ivanovic also "came out in favor not only of discussion among specialists, but also in favor of the entire people beginning to talk about this. He also raised the issue of which specialists are making decisions about this and why their names are being concealed." "After all, wasn't it our 'experts' who built the steel mills and the 'Obrovaces' and the 'FENIs'?" NIN asked.

How To Conduct Policy. The main question is whether with these kinds of divisions Yugoslavia is at all capable of conducting a consistent nuclear energy policy in the face of the national or multinational owners of nuclear technology? Is it possible to prevent this from being discussed in the half-darkness of business negotiations, in private arrangements, under the sponsorship of republic or certain local bodies of leadership? Can and will the laws of economics be respected?

In the present discussions of nuclear policy, however, interrepublic intolerances have flared up as never before. First, an attempt is being made to launch the argument that the nuclear program is being carried out by only one

Fear of Borrowing. "It has never occurred to anyone to repeat the lesson we learned with Krsko with respect to the financial package when it comes to any future nuclear power plant," Milka Planinc said in the debate in the LCY Central Committee. Krsko was purchased with credit whose repayment has been postponed several times. Interest, interest accrued during construction, and differences resulting from exchange rates have therefore accumulated. The new power plants are being purchased in a commercial arrangement so that they are paid for with counterdeliveries, primarily of nuclear high technology. "There is no question of any commercial tricks or taking advantage of a single occasion to make a profit. That will not get through the procedure of evaluating the bids (both foreign and domestic, author's note)," says Zarko Petrovic, manager in charge of preparation of construction of the Prevlaka NE.

Accordingly, if the demands for a referendum on the nuclear power plants are also motivated by a fear of the country's new uncontrolled borrowing, then that is a demand to condemn in advance those people who--at least as far as can be seen at present--are doing everything to prevent that indebtedness. There is really no justification for blaming those people for the old debts.

The fear of technological dependence on the foreign supplier of equipment and know-how is also related to the fear of new borrowing. However, this is another topic which cannot be discussed in advance. We have to await the bids. Everything that could be done to avoid any considerable strategic dependence was done in the rules stated in the advertisement inviting the bids. The foreigners are not really to blame for the fact that Yugoslavia does not have the know-how to manufacture the materials for the core of the nuclear reactor, much less the reactor itself.

Models in the World. France gets all of 65 percent of the electricity it generates from nuclear power plants, and no one has said that anyone is especially disturbed about that. In West Germany nuclear power plants generate 110 billion out of about 400 billion kwh generated every year. In Belgium precisely half of the power comes from nuclear plants. In the United States nuclear power plants are providing nearly 300 billion kwh (out of a total of about 2,300), which exceeds total power production in France or the total output in Yugoslavia, Italy, Austria, and Belgium taken together.

In France they have calculated that power from nuclear power plants is cheaper in the long run (it costs $.375) than power from coal ($.415) and power from oil ($.895 per kilowatt-hour), but in France the costs of generating electricity from coal included the costs of opening up new coal mines and the price of new locomotives and cars for shipping the coal.

It would be difficult to argue that over a lengthy period of time construction of nuclear power plants, say, in the countries of western Europe of most interest to us for comparison has been falling off, sticking at the same level, or has gotten into a crisis. On the graphs of power production in those countries the share of nuclear power plants has been increasing without interruption over the last 15 years, and in the plans for the end of the decade it has actually come on a par with the share of coal and water, and has considerably exceeded the share of oil.

Do we need any more examples?

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CSO: 5100/3032

INTER-AMERICAN AFFAIRS

REPORTAGE ON INTER-AMERCIAN NUCLEAR ENERGY GROUP MEETING

Concern Over 'Meager' Budget Noted

PY091715 Madrid EFE in Spanish 0004 GMT 9 Apr 86

/Text/ Buenos Aires, 8 Apr (EFE)--The delegates attending the 14th Inter-American Nuclear Energy Commission (IANEC) today expressed their concern over "the serious financial limitations of this commission."

In view of this situation, they agreed to request that OAS member countries give "more specific and effective" support to IANEC activities.

During the debates of the second plenary meeting held in the San Martin Cultural Center, the delegates from Paraguay, Argentina, Brazil, Venezuela, Guatemala, Colombia and Chile, among others, expressed their dismay over the commission's meager budget.

It was noted that IANEC has an annual budget of only $85,000, and they demanded the adoption of urgent measures aimed at bolstering the institution's budget.

The chief of the Argentine delegation, Abel Gonzalez, noted that "the problem of IANEC's economic limitations is crucial." He said that it is possible to obtain financial assistance and cooperation from international organizations, such as the IAEA.

For his part, the chief of the Brazilian delegation, Helcio Modesto da Costa, noted that it is necessary to seek the means to carry out a good program of activities, even with reduced financial resources.

He said: "Our countries are confronting serious problems as a result of the foreign debt and, therefore, have their budgets tied to foreign debt commitments.

Richard Corrie Matos, the chief of the Venezuelan delegation, generally said the same thing. He suggested staging publicity campaigns about the benefits of food radiation, an issue that will be discussed tomorrow during a technical discussion.

The debate took place during a review of the report that was submitted to the commission by IANEC Executive Secretary Vladimir Yackovlev.

The 14th IANEC meeting will end on 11 April.

Meeting Concludes

PY130255 Buenos Aires DYN in Spanish 2003 GMT 12 Apr 86

/Text/ Buenos Aires, 11 Apr (DYN)--The XIV Meeting of the Inter-American Nuclear Energy Commission /IANEC/, a technical organization belonging to the United Nations, concluded today after 5 days of sessions at the San Martin Cultural Center in this capital.

During these sessions special emphasis was given to the progress made in the technology regarding the preservation of food through nuclear radiation. This technology is already being experimented with in Argentina, Brazil, Colombia, Chile, and Peru, although so far not at the industrial level. The 9 April meeting was an open dialogue on the topic and at the same time nuclearly radiated food was tasted.

Experts from the 18 Latin American countries that participated in the meeting pointed out that the use of this technology at an industrial level might represent a reduction in post-harvest losses, as well as the opening of new markets for exporting Latin American products.

The technology for the nuclear radiation of food--which is being experimentally used on San Juan grapes--will prolong the freshness of perishable products meant for domestic as well as export markets.

During its next period of sessions, the IANEC Consulting Committee will stage in Latin America a broad education campaign about the radiation of food, the production of radioisotopes, and nuclear medicine, as well as the peaceful use of nuclear technology.

Dr Renato Radicella, from Argentina, was elected IANEC chairman for the next period, and Dr Helcio da Costa, from Brazil, was elected vice chairman.

The next meeting will take place in Brazil during the first 6 months of 1988.

/12228
CSO: 5100/2063

YRIART ON ARGENTINE-BRAZILIAN NUCLEAR ACCORD

Buenos Aires ENERGEIA in Spanish no 55, 1986 pp 12-15

[Article by Martin Yriart]

[Text] Two recent initiatives in the areas of legislation and international agreements seem to indicate that after an incomprehensible period of paralysis, the process of redirecting Argentina's nuclear policy, which the Radical government initiated in December 1983, has begun to move once again. On 30 November 1985 in Iguazu, President Raul Alfonsin and his Brazilian counterpart, President Jose Sarney, signed the Iguazu Declaration and the Joint Nuclear Policy Declaration. These two documents are of vital significance in shaping relations between the two countries in the sensitive field of atomic energy. And in the National Congress, the energy commission of the Chamber of Deputies has begun its consideration of a bill called the Argentine Nuclear Law.

The Political Framework

The Iguazu Declaration, a 32-paragraph document, reviews the major current topics in Argentine-Brazilian bilateral relations, and cites some important areas of agreement on both a regional and worldwide level in economic, political and social development problems. Paragraphs 22 and 24 to 27 state their intention to proceed with energy integration and in particular with cooperation in the Garabi and Pichi Picun Leufu projects, and with the interconnection of their electricity systems. Paragraphs 28 and 29 state their mutual desire to cooperate in the field of science and technology, with special mention made of the peaceful uses of nuclear energy.

Paragraph 31 states: "Both presidents express their pleasure at having on this date signed the Joint Nuclear Policy Declaration, which expresses the peaceful purposes of their nations' nuclear development programs, and which forms part of the best traditions of cooperation and peace inspiring Latin America."

The Iguazu Declaration contains two special features; a much more concrete and practical content than what is typically found in declarations of international good will; and in addition, a definite renunciation of any possible antagonism between the two countries represented, at least on the part of Argentina, with a moving away from earlier positions--whether explicitly stated or more or less concealed--and a clear reference to binational integration, even including complementary development between the two nations. Just a short time ago that concept was considered taboo in our foreign policy dealings with Brazil.

The Iguazu Declaration, particularly the points just mentioned, provides the political-economic framework for the Joint Nuclear Policy Declaration, whose text is published at the end of this article.

Revealing Phrases

In its brief provisions, the Joint Declaration contains statements which deserve comment; these points are discussed below in their order of appearance.

a. "The growing difficulties encountered with international supplies of nuclear equipment and materials." This statement heralds the formation of a front against the Club of London and the TNP [Non-Proliferation Treaty] (particularly Great Britain and the United States), which have not hesitated to erect obstacles impeding independent nuclear developments outside the orbit of NATO and the Warsaw Pact, even when the purpose of such developments is openly and is proven to be peaceful. As an example, the appeals by the developing nations to the IAEA [International Atomic Energy Agency] have not yielded positive results, and this discriminatory attitude toward them still persists in terms of assistance, even when they have accepted the TNP.

b. This "cooperation must be open to all Latin American countries which are interested in participating in it...and...have the same objectives." It is now clear that the application of safeguards of the TNP type to the signers of the Treaty of Tlatelolco, and the interpretation made of the latter treaty by some nuclear powers upon joining as members of that treaty, have ended in weakening its open and egalitarian nature, thus perpetuating the same inequalities as the TNP, and creating a division among the Latin American nations based on interests which are alien to them, such as the military supremacy of the nuclear powers which the TNP fosters.

c. "The creation of mechanisms to ensure the higher interests of peace, security, and development of the region." In essence, a replacement for the Treaty of Tlatelolco, which will ban nuclear weapons from Latin America and at the same time allow the free development of the peaceful uses of nuclear energy. These mechanisms might consist of a bilateral agreement for the mutual inspection of installations between Argentina and Brazil, which could then be extended to any other countries of the region wishing to share in this international safeguards system.

Repercussions and Reservations

Despite its significance, the Joint Declaration has drawn little commentary from the public opinion of both nations. Rosenthal Calmon Alves, a political analyst from the prestigious JORNAL DO BRASIL in Rio de Janeiro, noted the reluctance of some Brazilian military circles, which do not consider mutual inspections necessary. On the Argentine side, there may be sectors which feel that opening up installations such as the Pilcaniyeu uranium enrichment plant for inspection would be granting a unilateral technological advantage to Brazil in this field, in which Argentina is ahead, and exposing ourselves to industrial espionage from other nations.

The first of these objections is clearly contradicted by the perception of the international situation in terms of nuclear exchanges, a perception existing in both foreign ministries, which are responsible for seeking a way out of the impasse created by the TNP powers. The ability of Brazil's diplomats and politicians to overcome this military opposition--if such opposition truly exists--will provide a measure of the strength of democracy in Brazil.

Concerning enrichment technology, Argentina's presumed monopoly inside Latin America offers little economic advantage, for there are at least seven other nations in the world which possess this technology, and Brazil will obtain access to this technology sooner or later, by means of its nuclear cooperation agreement with Germany. Moreover, we should also put in the scale the amount that Argentina loses year after year, because of the delays and added costs created by the barriers erected by the TNP against the acquisition of nuclear technology.

Now that the doors have been opened up for a true integration and economic complementarity between the two nations, it may be hard to maintain a stance of excessive reticence about uranium enrichment, a technology in which Brazil is even more interested than Argentina is. Eventually the investment which the CNEA [National Atomic Energy Commission] has made in its development--which is at the present time incomplete and still requires some major industrial investments--will have to be put to use, and the possibility of associating with another country in this development would be an excellent way of making some profits in advance, by recovering part of the capital invested when the terms of this association are agreed upon.

Safeguards and Espionage

The idea of establishing a system of mutual inspections, moreover, does not necessarily imply interference by foreigners inside the safeguarded installations, since in principle a "black box" system could be used, with a single entry and exit, with accounting procedures for nuclear materials and monitoring of their origin and destination, to an extent sufficient to determine that no materials were being diverted for nonpeaceful uses. In any event, it is important to note that any safeguards system is effective to the extent that both parties demonstrate their good faith, and further that the beneficiary of the safeguards system is the one who opens his facilities up for inspection, not the one who inspects. If that is not the case, the system becomes unworkable.

Argentina's confidence in the inspections system as a means of preventing the holocaust of nuclear war was also reflected in the New Delhi Declaration signed in 1985, in which Argentina joined with India, Mexico, Tanzania, Sweden and Greece, in urging the nuclear powers to disarm, and offered the services of the Third World nations to guarantee the verifiability of the accords. That is one of the critical points of the worldwide nuclear weapons problem.

Time for a Law

The Argentine Nuclear Law bill, on which the Chamber of Deputies' energy commission has begun to work, contains a number of provisions concerning nuclear energy development for peaceful purposes and the application of safeguards. Drafted by the counsel of the Justicialist Party bench in the Chamber, Dr Alfredo Carella, the bill was introduced with the backing of deputies Diego Ibanez and Julio Cesar Araoz, as well as some others. The commission has appointed Carella and the Radical Party member Dr Enrique Mariano, a CNEA official, IAEA expert and member of the General Mosconi Energy Institute, to consult with the appropriate sectors and to prepare the final version of the nuclear law bill.

The Radical Party has also prepared its own bill, which has not been made public. That bill is now blocked in the president's office, because of the objections raised against it by the director of the CNEA, engineer Alberto Costantini.

According to the information available, there are some definite areas of agreement between the two bills--on the exclusively peaceful purposes of Argentina's nuclear program, and on the safeguards policy, with the added feature that the Radical Party bill apparently calls for internal safeguard mechanisms, following the Japanese model. The Justicialist version includes a unilateral statement renouncing the military uses of nuclear energy, and containing a provision for conferring legal status on this document by filing a ratification document with the foreign ministries of the nations with which Argentina maintains relations, as well as with international organizations. This would give it the international legal status of a treaty. But the Justicialist bill takes the position that only those installations, materials, equipment or technologies obtained from or exported to third countries would be subject to safeguards, with the added provision that safeguards agreements would have to be approved by Congress.

An in-depth analysis of the bill in question goes beyond the scope of this article, but it is possible to predict that, on the subject of peaceful uses and safeguards, no difficulties will arise in reconciling the positions of the two majority parties, and that Argentina's future policy in this area will not differ substantially from the line it has pursued in the past, even though some imaginative innovations may be introduced in the instrumental area, such as bilateral mutual inspection agreements and the creation of an internal accounting and control authority for nuclear materials.

The reaction of the nuclear powers to these developments remains to be seen. These agreements do represent alternatives not foreseen in their policy, although the accords should mean--for people who supposedly want to contain the worldwide proliferation of nuclear arms--positive steps taken toward strengthening the world's security.

Joint Nuclear Policy Declaration

The president of the Argentine Republic, Dr Raul Alfonsin, and the president of the Federative Republic of Brazil, Dr Jose Sarney, after talks held in Puerto Iguazu, Argentina, and in Foz do Iguazu, Brazil, on 29 and 30 November 1985,

Considering:

That nuclear science and technology play a vital role in the life of any modern country, by significantly stimulating its social and economic development.

That both countries have worked for many years on research and studies of nuclear energy applications for peaceful purposes; that this has required them to make huge investments in order to reach an appreciable level of knowledge, which now gives them access to the possibility of helping their respective peoples with advances derived from the peaceful use of nuclear energy.

That cooperation between Argentina and Brazil will serve to multiply the benefits that they may each reciprocally obtain from the peaceful use of nuclear energy; and that it will enable the two nations to face in better conditions the growing difficulties encountered with international supplies of nuclear equipment and materials.

That this cooperation must be open to all Latin American countries which are interested in participating in it,

Hereby reiterate:

1. Their commitment to develop nuclear energy for exclusively peaceful purposes.

2. Their intention to cooperate closely in all fields of the peaceful application of nuclear energy and to work on a complementary basis in areas in which they may reciprocally feel it appropriate to do so.

3. Their strong desire that this cooperation may be extended to other Latin American countries with the same objectives.

And declare:

4. Their decision to establish a joint working group under the responsibility of the Argentine and Brazilian foreign ministries, to be composed of representatives of their respective nuclear commissions and enterprises, for the purpose of stimulating relations between the two countries in this area, promoting their nuclear technological development, and creating mechanisms to ensure the higher interests of peace, security and development of the region, without prejudice to the technical aspects of nuclear cooperation, which will continue to be governed by the instruments in force.

In accordance with the above mentioned objectives, the two presidents have instructed their respective foreign ministries to convene a meeting of the working group within a period of 120 days, in order to examine procedures leading to the implementation of the present declaration.

Foz do Iguazu, 30 November 1985.

Raul Ricardo Alfonsin Jose Sarney

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ARGENTINA

BRIEFS

URANIUM PROSPECTING AGREEMENT SIGNED--Buenos Aires, 3 Apr (DYN)--Adolfo Rodriguez Saa, governor of San Luis, and Alberto Constantini, president of the National Atomic Energy Commission (CNEA), today signed an agreement by which they promised to work jointly in the exploration and exploitation of uranium. The agreement, which follows guidelines established by the mining code and other legislation on this matter, also grants the San Luis Province the right to ask for "scholarships for specialization" and confirms the operation of La Estela uranium mine. The agreement was signed this afternoon during a press conference with the participation of Rodriguez and Constantini in addition to other San Luis Province and CNEA officials. Officials said that the extraction and processing of uranium in La Estela mine in the Comechingones mountain range, which has been operating since November 1985, are being carried out in addition to efforts at the Sierra Pintada (San Rafael, Mendoza Province) and Gigantes (Cordoba Province) uranium deposits. La Estela mine is a new national source for uranium. /Text/ /Buenos Aires DYN in Spanish 0131 GMT 4 Apr 86 PY/ 12228

NEW PRESIDENTIAL, CNEA ADVISERS--Buenos Aires, 26 Mar (TELAM)--It was officially reported today that the executive branch has designated Jose Carlos Piva and Armando Ortega Furlotti as presidential and CNEA /National Commission for Atomic Energy/ advisers, respectively. /Excerpt/ /Buenos Aires TELAM in Spanish 1940 GMT 26 Mar 86 PY/ 12228

CSO: 5100/2063

PANEL RECOMMENDS NUCLEAR PACT WITH ARGENTINA

PY181805 Brasilia Radio Nacional da Amazon Network in Portuguese 1000 GMT 18 Apr 86

[Text] Brazil and Argentina may set up a mechanism for mutual inspection of their nuclear programs. This is one of the proposals that the Nuclear Program Evaluation Committee put forward to President Jose Sarney on 17 April. The proposal was justified on the grounds that Brazil and Argentina have made considerable progress in this field. The committee also concluded that Brazil must adopt a nuclear program to develop its own technology by the year 2000.

Committee President Jose Israel (Walker) has said that our hydroelectric potential will meet our energy demand only until 2010, at most.

[Begin (Walker) recording] The first conclusion the committee reached is that the Brazilien nuclear program is facing serious difficulties, despite the fact that it is vital for meeting our electric power demands over the next few decades. Based on Eletrobras [Brazilian Electric Power Companies, Inc] data, the committee concluded that our electric power demand will surpass our hydroelectric potential by 2005 or 2010, and that it will be necessary to count on electric power generated with coal or with nuclear energy. [end recording]

The committee also emphasized the need to nationalize the nuclear research program. To this end, the National Nuclear Energy Council will have to be divided into two sections: one to deal exclusively with [word indistinct] and development, and the other to take care of the regulations, supervision, and authorizations affecting the companies of the sector.

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CSO: 5100/2060

BRAZIL

SEABRA, REX NAZARE COMMENT ON CURRENT STATUS OF PROJECTS

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Mar 86 p 3

[Text] Rio de Janeiro--Licinio Seabra, president of Nuclebras, asserted yesterday that the government is likely to absorb part of the company's debts, but added that the commission reevaluating the nuclear program will likely propose a "shrinkage" of the state enterprise. In that event, the Nuclebras subsidiaries responsible for operation, construction and engineering of nuclear plants would most likely become part of the electrical sector, being absorbed by Furnas and Eletrobras.

At the First Brazilian Nuclear Energy Congress, in Rio, Licinio supported continuation of the nuclear program, which he believes needs, during the period of absorbing technology, nonreimbursable funds, as it cannot show immediate results.

The Nuclebras president also spoke in favor of the project for enriching uranium by the jet-nozzle process, now being conducted by NUCLEI [Nuclebras Isotope Enrichment, Inc] in Resende, asserting that only after 2 or more years will Nuclebras be able to ascertain the feasibility of this process from the industrial point of view and how much investment it will require.

Meanwhile, Rex Nazare Alves, chairman of the National Nuclear Energy Commission [CNEN], recalled that the autonomous nuclear program always sought to use resources existing within the country as a basis and to depend upon its own technology. He explained that the CNEN was seeking to develop its own technology in the fuel cycle to provide other alternatives for the uranium-enrichment process.

The CNEN chairman also emphasized that the program for building a domestic research reactor is progressing well. According to him, the conceptual design of the domestic research nuclear reactor is now ready, prepared by engineers at the Minas Gerais Federal University. Most of the components are being developed and this prototype will be produced entirely by domestic industry. Construction of this reactor should begin in the next few months and the construction period will be 4 to 5 years.

According to Marcio Costa, director of Furnas Power Companies, Inc., the Angra 1 plant should enter commercial operation by the end of May, after finishing the replacement of condensor tubes, currently of copper, by tubes of a titanium alloy which will not rust when in contact with fluoridated water. After this repair, Marcio Costa believes the Angra 1 power plant will be in suitable condition for entering commercial operation, after going through another inspection by the CNEN.

According to Mario Costa, operation of Angra 1 is essential for the Furnas system, as supply is currently very vulnerable. Transporting huge amounts of energy for long distances reduces the reliability of the system and any accident to a 500-KV line can leave Rio in the dark, unless energy is brought in from thermoelectric power plants.

As this is one of the worst drought years of recent times and as the Southeast is already sending 1.2 million kilowatts to the South region, there remains no alternative but to begin operating thermoelectric plants that use diesel fuel and coal, which would result in additional expenditures of $300 million. For purposes of comparison, he said that the Piratininga thermoelectric plant spends $160 million to produce 400,000 kilowatts, while Angra 1 consumes only $20 million annually to produce 626,000 kilowatts, which is why it is essential.

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CSO: 5100/2059

BRAZIL

NUCLEN HEAD WARNS AGAINST DIVISION OF NUCLEBRAS SUBSIDIARIES

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 20 Mar 86 p 33

[Text] Rio de Janeiro--Carlos Syllus Martins, director of NUCLEN (Nuclebras Engineering, Inc.), yesterday warned against spinning off Nuclebras subsidiaries according to the plan proposed by the commission that is reevaluating the nuclear program, stressing that construction of a nuclear plant is not a conventional undertaking and "there are substantial risks in transferring NUCLEN to Furnas or Eletrobras."

At the First Brazilian Nuclear Energy Congress, the NUCLEN director said that three nuclear power plants have been built in the United States and are unable to operate because construction defects have prevented their obtaining a license. This is because they were built as conventional construction jobs, in which the construction phase is independent of the installation phase.

Syllus Martins pointed out that the construction and installation phases must be undertaken simultaneously and that for 10 years Nuclebras has been following this procedure "and sees no advantage in changing existing work methods." He further expressed fears that, if the nuclear program is reactivated, Nuclebras will be unable to reassemble its technical personnel.

He explained that, of the 130 engineers trained in Germany, 35 have already left NUCLEN, which "has missed their technological expertise." If the nuclear program were to be given a green light, "we would have trouble resuming the pace of 3 years ago." Even among the private industrial firms that adapted themselves to the needs of the nuclear program, "there is no longer the slightest enthusiasm," he added.

According to him, the consequences of decelerating the nuclear program are extensive, as the technical teams "have become dispersed and, even if there again were sufficient funds, Nuclebras would have to make a considerable effort to reverse the expectations of technical personnel, who have become discouraged by current prospects."

Considerable enthusiasm was displayed by scientists attending the Congress, who feel that the nuclear sector has already seen its worst days and will now recover its importance and construction will be resumed. Several asserted that the commission reevaluating the nuclear program, besides recommending to [Mines and Energy Minister] Aureliano Chaves that Angra 2 and 3 be carried out at a pace that at least makes up for lost time, is likely to request construction of another unit at the Adm Alvaro Alberto nuclear plant, to be called Angra 4.

Among representatives of private companies such as Confab, Cobrasima, Bardella, and consulting firms such as Natron and Promon, as well as construction contractors such as EBE (Brazilian Engineering Company) and Norberto Odebrecht, the climate was one of discouragement and distrust, in view of the fact that Nuclebras still owes them 80 billion cruzeiros.

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CSO: 5100/2059

BRIEFS

CNPQ HEAD ON TECHNOLOGY IMPORTS--Brasilia--Reward competence, put pressure on the government to show that scientific and technological development is important for the nation and facilitate importation of technology to achieve the sector's proper development. These are some of the principal goals of the new president of the National Council for Scientific and Technological Development (CNPq), Clodowaldo Pavan, introduced yesterday by Science and Technology Minister Renato Archer. The new CNPq president will take office Thursday at 1100 hours. Clodowaldo, 66, from Campinas, Sao Paulo, has been serving three consecutive terms as president of the Brazilian Society for the Advancement of Science (SBPC). He is a biologist, a professor of genetics at Campinas State University and was chairman of the CTA [not further identified] of the Foundation for Research Support of Sao Paulo State. The new CNPq, as Clodowaldo called it, will be governed by a new statute, already approved by President Sarney, which is being studied by the president's legal staff. The new statute provides for restoration of a Deliberative Council, abolished in 1974, composed of 15 members, 8 of them from the scientific community, with an executive directorate. "This makes it possible to strip the presidency of absolute power, making the institution more democratic and providing effective participation by the scientific community," asserted Clodowaldo. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 1 Apr 86 p 34] 8834

RE-EVALUATION COMMISSION RECOMMENDATIONS--Dissolution of Nuclebras Engineering, Inc. (NUCLEN), a subsidiary of Nuclebras; denationalization of Nuclebras Heavy Equipment, Inc. (NUCLEP); guaranteed funds to complete the Angra 2 and 3 nuclear plants; and creation of a higher authority attached directly to the Presidency of the Republic to direct all activities of the Brazilian nuclear program. These are some of the major points to be submitted to President Jose Sarney on 19 April by the commission that is evaluating the Brazilian nuclear program. The members of the commission, headed by Jose Israel Vargas, met in Rio for the last time, to analyze the points to be included in the final report. The most delicate matter to be submitted to the president is whether more plants should be constructed beyond the first two. According to the agreement signed with Germany in 1975, Brazil promised to build four plants in addition to Angra 1. Angra 2 and 3 are in construction and, in compensation, the German firm Kraftwerk Union (KWU) will transfer all technology for plant construction and for the fuel cycle. [Text] [Rio de Janeiro O GLOBO in Portuguese 27 Mar 86 p 26] 8834

CSO: 5100/2059

ATOMIC ENERGY AGENCY DIRECTOR INTERVIEWED

Amman AFAQ 'ILMIYAH in Arabic Jan-Feb 86 pp 18-21

[Interview with Dr Muhammad 'Izzat 'Abd-al-'Aziz, deputy director of the Egyptian Atomic Energy Authority, by Taysir Subhi: "We Will Build a New 20-Megawatt Nuclear Reactor in Anshas; We Will Dispose of Wastes Not in Sinai, but in a Nuclear Furnace; Arabic Nuclear Integration Is Necessary, Political Disputes Must Be Overcome to Achieve It; Uranium Is Present in Arab Phosphates, Its Extraction Awaits a Decision on Integration"; date and place not given]

[Text] In this feature, AFAQ 'ILMIYAH continues its presentation of Arabic scientific research institutions and centers. The magazine is attempting through inquiry and dialogue with those responsible for these centers to shed some light on their plans, accomplishments, problems, and projects for the future.

In this issue we discuss an Egyptian Arab scientific institution, the Atomic Energy Authority in Cairo. A representative of AFAQ 'ILMIYAH met with Prof Dr Muhammad 'Izzat 'Abd-al-'Aziz, deputy director of the Atomic Energy Authority.

Dr Muhammad 'Izzat 'Abd-al-'Aziz, deputy director of the Atomic Energy Authority, was kind enough to answer a number of questions. We present the most important of them here.

Obstacles to Work: Inadequate Funding, Emigration of Experts

[Question] I think it would be natural for me to begin, when the subject concerns an Arab institution, with a question about the obstacles to work. Can you tell me about these as relates to the Atomic Energy Authority?

[Answer] There are several difficulties, obstacles, and bottlenecks hindering the progress of work. Perhaps the first of these obstacles is the serious lack of funding. Over a number of years, inadequate budgets have resulted in the obsolescence and breakdown of much scientific apparatus and have made the projects and plans of the authority so much ink on paper. Add to that a more serious problem represented by the emigration of a not insignificant percentage of experts and workers in the agency.

Cooperation Agreements

[Question] At this stage in the development of your agency, you must have a pressing need to obtain more of the expertise of other countries in this advanced field. What are the most important agreements for scientific cooperation that you have concluded with foreign agencies?

[Answer] Since the authority was founded, agreements for scientific cooperation have been concluded with several Arab and foreign scientific agencies and institutions. Among the most prominent cooperation agreements are those with West Germany, France, Italy, India, America, and East Germany. By these agreements, we obtain apparatus and equipment, send missions for training in these countries, exchange scientific visits, carry on joint research, as well as other potential areas of cooperation.

The Egyptian Atomic Energy Authority previously concluded a bilateral agreement with the Soviet Union for cooperation in areas relating to the peaceful uses of nuclear energy. The Atomic Energy Authority is also working to strengthen its relations with scientific institutions, universities, and ministries inside the Arab Republic of Egypt and outside.

Arab Nuclear Experiences

[Question] You previously worked as consultant to the Atomic Energy Authority in Libya. Could you tell us about your experience there?

[Answer] Yes, I worked for a long time in Libya and took part in establishing the Center for Nuclear Research there, one of the largest nuclear centers in the Arab world. In that center, they have possibilities not available in many of the other Arab nuclear centers. We were able to establish a nuclear fusion research laboratory where important scientific research is now going on aimed at creating an alternative source of energy relying for its basis on nuclear fusion.

In Egypt, we proposed establishing a nuclear fusion laboratory that would include the system known as Tokomak. This system will shortly be used in the first experimental nuclear fusion reactor built by the European Community. This reactor, located in Britain, is known as (JIT). While we are talking about nuclear fusion reactors, we ought to mention that there are experimental reactors of this kind in the Federal Republic of Germany and the Soviet Union.

Military Nuclear Research

[Question] As is well known, Egypt has signed the International Agency for Atomic Energy treaty to prevent the spread of nuclear weapons signed in Vienna on 7 October 1981. While Egypt is bound by it, the Zionist entity [Israel] has not signed this treaty and is not bound by its provisions. What do you say about this?

[Answer] What you have mentioned about Egypt's signing the treaty of the International Agency for Atomic Energy is true. The Arab Republic of Egypt strives to use nuclear energy for peaceful purposes. In return, Egypt receives support from the agency and from numerous international atomic agencies and institutions. As for the refusal of some states to sign this international treaty, it is because they possess nuclear weapons. I do not believe the International Agency or its member states, including Egypt, will stand with hands tied in the face of any "stupidities" committed by any of the nations that have not signed the treaty to prevent the spread of nuclear weapons. Until now, Egypt has not turned to military applications.

Nuclear Fuel Plant

[Question] Why does Egypt intend to buy a plant to produce nuclear fuel?

[Answer] It is no secret that we have contracted with foreign agencies for the purchase of a plant to produce nuclear fuel. By means of this plant, it will be possible to produce nuclear fuel in practical quantities. We recently received a large part of the equipment and production in the plant is expected to begin early next year. The plant will be one of the basic installations working toward the application of nuclear research for peaceful purposes and toward supporting development plans. It should be mentioned that this project was carried out in cooperation with the International Agency which is continually offering us material and moral support.

Alternative Energy

[Question] At a time when the oil reserve is dwindling, do you have any projects that aim at providing alternative sources of energy?

[Answer] The quantity of oil that Egypt possesses will be exhausted within 10 years. In order to provide alternative sources of energy, the Atomic Energy Authority has made plans that have now entered the stage of implementation. Egypt has invited international bidding for the construction of three nuclear power plants. The first plant will be constructed in an area 160 km west of Alexandria. It will have a capacity of 1,000 megawatts, and its cost will be $1.85 billion (American). The costs of building this plant will be covered by a loan from a banking consortium in which a group of European countries participate. The second nuclear power plant will be of the double type with a capacity reaching 2,000 megawatts. Its cost of $2.3 billion will be financed by a loan from the governments of France and Italy. A third nuclear power plant, with a capacity of 1,000 megawatts, will be built at a cost of $1.4 billion. It will be implemented by a loan offered by Spain, Belgium, and Japan.

Why Does Arab Nuclear Integration Not Take Place?

[Question] One notices that a number of Arab states possess a number of atomic institutions, but one also notices that there exists no kind of coordination and cooperation among them.

[Answer] This is true. In some of the Arab states there now are significant research institutions. I have already spoken about the advanced Libyan experience in the field of nuclear research. Another experience is in Iraq. There are attempts under way in Jordan and perhaps in other Arab countries. These are experiments, institutions, and attempts scattered here and there. The question of coordinating the efforts within the framework of Arab integration is a matter of utmost importance and is the wish of every Arab. We have often called for the realization of this wish. At every meeting, we have emphasized the importance of Arab integration in all fields, especially scientific ones. Yet, in spite of many demands and repeated emphases, no step on this path has been taken. Is it because the basic elements of integration are not sufficiently available--or what is it? The basic elements are there in abundance, but why do we not integrate, at least on the scientific level? I do not know. I think politics stand as a stumbling block, given the variety of political ideologies, directions, and movements.

It is my belief that this obstacle can be overcome. There are many examples of this. The Soviet Union participates in an electrical network with a number of (Western) European states. The European Community takes part in establishing scientific centers and institutions, funding and supporting them in order to realize common profit and benefit, in spite of the differing policies and ideologies of the states of this community.

Just as there exists the possibility of establishing an Arab center for nuclear research, there is an even greater possibility of establishing electrical networks at the level of the Arab world, especially if we are able to build nuclear fusion reactors.

The Regional Center for Radioactive Isotopes

[Question] What has happened with the Regional Center for Radioactive Isotopes?

[Answer] This center was established early in the sixties with its headquarters in al-Duqqi (Cairo) and is supervised by a council composed of representatives of the Arab states. It was established with the goal of training Arab scientists from all specializations in the use of radioactive isotopes in all applied fields. The center was made regional so that it might offer its services to all the Arab countries. I would take this opportunity to announce that the center welcomes the cooperation of Arab scientific institutions and centers and is ready to receive missions from any Arab agency interested in the activities of the center and wishing to take advantage of its services.

Nuclear Wastes

[Question] In recent times, there have been reports that you intend to bury the nuclear wastes that you have accumulated in the Sinai desert. How true is this?

[Answer] It is not the intention of Egypt to do any such thing. We have pondered this question for a long while and have concluded that the best way to dispose of nuclear wastes is the kind of nuclear furnace called a thermal plant. This plant consists of a huge center containing several thermal cells. Such a plant can be used effectively to dispose of medium- and low-level radioactive wastes. We set out to establish such a center several years ago.

It will begin operating within the next 2 years. Construction and equipping of the plant were partly funded by the International Agency for Atomic Energy, on condition that no other such plant be built in any of the states of the region. This means that permission will not be given to construct another center for nuclear waste disposal in the region due to the high costs and the difficulty of providing the equipment necessary for its operation. All states in the region will be allowed to use the thermal plant located in Egypt.

The equipment for the thermal plant is currently being manufactured in the Federal Republic of Germany in accordance with the agreement the two countries have signed on the subject. This nuclear furnace can burn up about 15 kg of wastes in 1 hour and can operate night and day. By obtaining this equipment, we have been able to solve the problem of nuclear wastes. By announcing this project, we have replied to the reports of our intending to bury our nuclear wastes in the Sinai desert.

Star Wars

[Question] What do you have to say about Star Wars?

[Answer] I think it unlikely that Star Wars can be implemented. If [such a war] were to break out it would lead to the destruction of all forms of life. I think the question of the arms race between the two superpowers, the Soviet Union and America, is a political question in the first instance, the goal being acquisition of the power of decision and of a political position through the acquisition of these weapons of destruction. The destructive consequences that resulted from the Hiroshima and Nagasaki bombs will perhaps deter mankind and prevent the repetition of such a tragedy for mankind.

New Reactor in Anshas

[Question] In what stage is the Egyptian Atomic Energy Authority now?

[Answer] We have now moved from the stage of establishing and forming the foundation of nuclear science into a new stage that will witness a broadening of the uses of nuclear power, development, and expansion of all existing institutions, and modernization of our equipment and machinery. Among the projects occupying us at the moment is the construction of a new nuclear reactor in the Anshas area with a greater capacity. The present Anshas reactor has exhausted all of its objectives and achieved all the goals and purposes for which it was built. Its assumed lifespan is over. This Russian reactor played a part in creating a broad base of nuclear science and in graduating a great many trained scientific cadres. It has produced radioactive isotopes as well as nuclear fuel. It continues to operate because of numerous modifications we have performed on it. The capacity of the Russian reactor does not exceed 2 megawatts.

The new reactor that we wish to acquire has a capacity of 20 megawatts and will be able to give us a great impetus in electronics. This is something of utmost importance, especially in the coming stage, which will witness the practical production of nuclear fuel, experiments with nuclear fuel, and the building of nuclear power stations.

Uranium From Phosphate

[Question] Why is the uranium from Moroccan or Jordanian phosphate not being used?

[Answer] It is something that is possible, but it requires first of all that decisions about integration be made at the level of joint Arab activity and that close cooperation take place between the relevant Arab countries. Phosphate is a natural source of uranium that should not be overlooked.

[Box, p 19]

The Egyptian Atomic Energy Authority in Outline

The Egyptian Atomic Energy Authority was established in 1955 to take advantage of this energy and of its uses for scientific and applied purposes. The authority includes four scientific centers:

--the Nuclear Research Center

--the National Center for Research on Radiation and Its Technology

--the Thermal Laboratory Center

--the Nuclear Regulation and Security Agency.

The Nuclear Research Center, which is the center of the authority's activity, includes 12 scientific sections. At work on implementing its scientific program are 37 professors, 50 assistant professors, 94 instructors, 117 assistant instructors, and 53 tutors, in addition to a staff of workers, engineers, technicians, and administrators numbering about 2,000.

Current research at the center aims at supporting the national nuclear energy program through the programs of the following sections: reactors and nuclear metals, neutron and reactor physics, and nuclear chemistry. This research also aims at creating a foundation of nuclear science and trained scientific cadres in various nuclear activities, both applied and theoretical. This is in addition to the center's applied research into the uses of radioactive isotopes in radiation biology and agriculture, and other subjects.

The activity of the Atomic Energy Authority in the field of practical applications is embodied in the National Center for Research on Radiation and Its Technology. The latter includes sections for radiation biology, radiation research on plant production, radiation chemistry research, radiation physics research, radiation engineering research, and research into developing existing industries and improving their products.

One of the newest scientific centers affiliated with the Atomic Energy Authority is the Nuclear Regulation and Security Agency which was established in 1982. This agency has prepared studies on the regulatory steps and measures necessary for the issuance of nuclear power plant licenses, on the security standards for nuclear power stations, and on regulations for licensing operating crew members for nuclear power plants.

Also among the authority's centers is the Thermal Laboratory which carries on research on the analytic chemistry of the combustible fuel cycle, radioactive environmental pollution, radiation protection and security, alpha ray research, the treatment of radioactive residues, combustible nuclear fuel cycle engineering, and the chemistry of combustible nuclear fuel.

12937/12859
CSO: 5100/4608

NUCLEAR POWER PROJECT NEW BIDS SOUGHT

London MIDDLE EAST ECONOMIC DIGEST in English 4 Apr 86 pp 10, 11

[Text] The government has asked the three bidders for the country's first nuclear power project to put in fresh offers for the $1,000 million-plus contract by 20 April. Earlier in March, the client--the Nuclear Power Plants Authority--extended the validity of the original bids by four months, to 25 June (MEED 1:3:86).

The three bidders for the plant--to be built at El-Dabaa--are West Germany's Kraftwerk Union (KWU), the US' Westinghouse Electric Corporation and a Franco-Italian consortium led by France's Framatome. They have been assured that the project will go ahead by Prime Minister Ali Lotfi and the client, but diplomats in Cairo say other ministers are questioning the project's viability.

One possible outcome is for a letter of intent to be awarded to one or more of the bidders, followed by protracted negotiations, diplomats say. A contract award has already been delayed several times since May 1985.

/9317
CSO: 5100/4610

INDIA

GANDHI ON NUCLEAR POLICY IN RELATION TO PAKISTAN

Madras THE HINDU in English 9 Apr 86 p 1

[Article by G.K. Reddy]

[Excerpt]

NEW DELHI, April 8.

The Prime Minister, Mr. Rajiv Gandhi, said today that if Pakistan acquired nuclear weapons, India will have to "think seriously about its own option," since the country could not afford to remain complacent in the face of such a sudden shift in the strategic balance in the region.

In his reply to the debate in the Lok Sabha on the Defence Ministry's demands for grants, he disclosed that India had some very definite indications that Pakistan was going ahead with its nuclear programme.

The Prime Minister had made a pointed reference to this threat after almost six months of silence on the subject. But much of what he said today was intended to stress the point made in the Defence Ministry's annual report that "we must be cognisant of the fact that Pakistan has moved closer to acquiring the capability to make nuclear weapons which had an obvious bearing on our security."

Commitment to peace

Assuring all concerned that India was committed to using atomic energy only for peaceful purposes, Mr. Rajiv Gandhi stressed that it did not possess any nuclear weapons, nor was it interested in acquiring them. But the country will have to reconsider its position if Pakistan produced a bomb posing a serious threat to it.

The Prime Minister dealt with the nuclear issue not because he wanted to tell the world that India would not hesitate to exercise the option if Pakistan succeeded in acquiring nuclear capability, but to assure the members who raised the issue during the debate that the Government was not being complacent. It was in this context that he said that India would continue to mobilise world opinion, working in close concert with other like-minded countries to persuade and prevent Pakistan from persisting in its bid to acquire nuclear weapons.

/9317
CSO: 5150/0091

INDIA

NUCLEAR POWER BOARD CHAIRMAN SPEAKS TO ENGINEERS

Calcutta THE TELEGRAPH in English 15 Mar 86 p 1

[Text]

Calcutta, March 14: The department of atomic energy will soon raise the tariffs for nuclear power in its bid to mop up resources for investment in creating additional nuclear power generation capabilities, Dr M.R. Srinivasan, chairman of the Nuclear Power Board (NPB), said here today.

Addressing a meeting of the Association of Indian Engineering Industry (AIEI) here today, Dr Srinivasan said the atomic energy department was taking this step in addition to its plan for floating power bonds to raise money needed to finance its Rs 1,400-crore scheme in nuclear power in the Seventh Plan.

According to him, the Centre has assured the Atomic Energy Commission an outlay of Rs 600 crores by it in the Seventh Plan. The projected expenditure approved by the Centre in this Plan period is Rs 1,400 crores, against the Commission's demand of Rs 2,020 crores, he added.

Commenting on the demands for setting up a nuclear power plant in the eastern region, Dr Srinivasan said he, as head of the site selection committee for new nuclear plants, had recommended certain location in West Bengal and Orissa.

Dr Srinivasan said the country's 15-year nuclear power plan, which envisaged an installed capacity of 10,000 MW in atomic plants, would have 12 reactors of 235-MW and 10 of 500-MW besides the ones already planned. Among these four 235-MW plants and two 500-MW reactors have been approved by the Centre, he said.

Construction work for the country's first 500-MW fast breeder reactor will begin by 1987 and the work of this prototype reactor will depend on the success of the operation of the fast breeder test reactor at Kalpakkam

/9317
CSO: 5150/0085

INDIA

NUCLEAR POWER BOARD CHAIRMAN ON EQUIPMENT NEEDS

Bombay THE TIMES OF INDIA in English 20 Mar 86 p 13

[Text] BOMBAY March 20: Dr. M. R. Srinivasan, chairman, Nuclear Power Board (NPB) has hit out at the Indian engineering industry for a lack of innovation in manufacturing. Except product technology obtained from abroad, the industry in most cases has not gone beyond the design and process technology. Other countries having once imported products have developed further on all aspects on their own, he said.

Delivering the keynote address at a workshop on "Equipment requirements of nuclear power plants", organised by Association of Indian Engineering Industry (AIEI), Dr. Srinivasan said most of the units had still a lot of learning to do. The fragmentation of the industry is bad. The industry will have to reorganise itself and make introspection. The capability is there and if it is well organised, the country can easily exceed the target of 10 per cent nuclear power by the turn of the century.

The nuclear power programme in the coming years will no longer accept delays in delivery of equipment as it is planned to bring down the gestation period of projects to cut down on costs, he said. The industry will have to gear up in time schedules and in standardisation of components. Power plant equipment in future will have to operate with the highest reliability. The NPB will short list vendors for equipment and encourage units manufacturing at minimum cost. He blamed the high cost of equipment due to lack of competition. For the nuclear power programme, it is planned that a large part of inputs will have to be from local sources.

Mr. K. N. Shenoy, vice-president, AIEI, said in many cases local equipment became costlier since, imported equipment was allowed with concessional rates of duty. He gave as instances, the import of fertiliser plants and equipment and power equipment, of late. Another reason for the high prices is due to low capacity utilisation. He urged that the industry be supplied steel at international prices. The industry wants competition but does not want to face dumping.

Mr. T. S. Champaknath, chairman of AIEI's nuclear plant division, said the industry needs to upgrade its technology. The wide gap in funds required for the NPB's nuclear power programme can be bridged from the capital market, he said. The industry is confident to help achieve 10 per cent power supply from atomic energy by the end of the century.

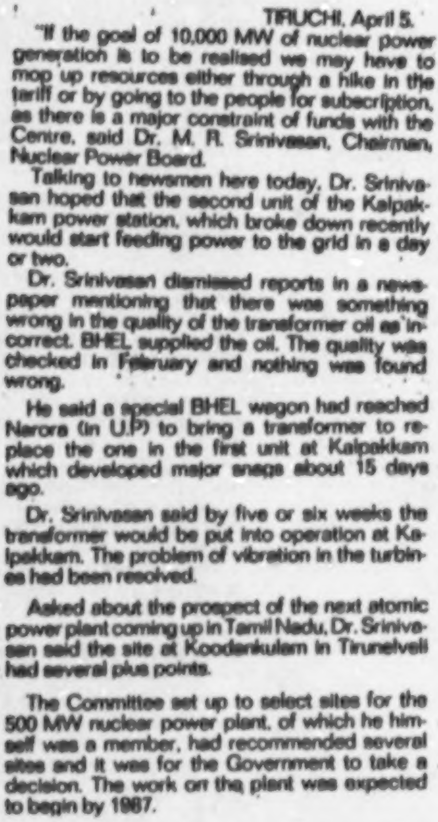
/12851
CSO: 5150/0087

INDIA

NEED FOR FUNDS STRESSED BY POWER BOARD CHAIRMAN

Madras THE HINDU in English 6 Apr 86 p 12

[Text]



TIRUCHI, April 5.

"If the goal of 10,000 MW of nuclear power generation is to be realised we may have to mop up resources either through a hike in the tariff or by going to the people for subscription, as there is a major constraint of funds with the Centre, said Dr. M. R. Srinivasan, Chairman, Nuclear Power Board.

Talking to newsmen here today, Dr. Srinivasan hoped that the second unit of the Kalpakkam power station, which broke down recently would start feeding power to the grid in a day or two.

Dr. Srinivasan dismissed reports in a newspaper mentioning that there was something wrong in the quality of the transformer oil as incorrect. BHEL supplied the oil. The quality was checked in February and nothing was found wrong.

He said a special BHEL wagon had reached Narora (in U.P) to bring a transformer to replace the one in the first unit at Kalpakkam which developed major snags about 15 days ago.

Dr. Srinivasan said by five or six weeks the transformer would be put into operation at Kalpakkam. The problem of vibration in the turbines had been resolved.

Asked about the prospect of the next atomic power plant coming up in Tamil Nadu, Dr. Srinivasan said the site at Koodankulam in Tirunelveli had several plus points.

The Committee set up to select sites for the 500 MW nuclear power plant, of which he himself was a member, had recommended several sites and it was for the Government to take a decision. The work on the plant was expected to begin by 1987.

/9317
CSO: 5150/0090

INDIA

BUDGET PROVISIONS FOR NUCLEAR POWER UNITS TOLD

Madras THE HINDU in English 24 Mar 86 p 6

[Text] NEW DELHI, March 23.

The total provision in the 1986-87 Central budget (revenue and capital sections together) on the existing and upcoming nuclear power projects in the country is Rs. 469.21 crores. Out of this, the provision for Plan schemes is Rs. 240 crores and the rest is for non-Plan expenditure.

The 1986-87 budget provision is about Rs. 58.45 crores (Rs. 9.63 crores on the revenue account and Rs. 48.82 crores in the capital section), higher than the revised estimate for 1985-86. But the revised estimate for the outgoing year (Rs. 410.76 crores) is Rs. 18.54 crores lesser than the original provision of Rs. 429.30 crores in the 1985-86 budget.

Among the projects for which the higher 1986-87 outlay in the revenue section is earmarked are Rs. 3.52 crores for the Madras Atomic Power Station (MAPS), and Rs. 7.22 crores for the payment of interest charges on heavy water held in stock.

Procurement of materials: On the capital account the higher 1986-87 outlay is intended for advance procurement of materials and equipment for future atomic power stations (Rs. 14.04 crores), Kakrapar Atomic Power Project in Gujarat (Rs. 19.70 crores), Narora Atomic Power Project in U.P. (Rs. 8.98 crores), Kaiga Atomic Power Project in Karnataka (Rs. 1.63 crores), Rajasthan Atomic Power Project units 3 and 4 (Rs. 3.40 crores), two new 500 MWe atomic power stations (Rs. 2.75 crores) and development works for 500 MWe reactors (Rs. 4.20 crores).

But the increase is offset by the reduced provision for the MAPS units 1 and 2 to the tune of Rs. 7.72 crores.

The country's first atomic power station at Tarapur near Bombay, which has two boiling water reactors fuelled by enriched uranium with a total capacity of 320 MWe, has been provided in the 1986-87 budget with Rs. 63.39 crores.

The provision for the Rajasthan Atomic Power Station, which has two natural uranium fuelled and heavy water moderated pressurised heavy water reactors with a total capacity of 440 MWe, is Rs. 70.37 crores. The first RAPS unit has been operational since December 1973 and the second since April 1981.

The MAPS at Kalpakkam has two pressurised heavy water reactors with a total capacity of 470 MWe. The provision of Rs. 73.16 crores for these two units in the budget is mainly for operation and maintenance of the station (Rs. 64.95 crores), and for capital expenditure on the procurement of equipment and for civil and electrical works (Rs. 8.21 crores).

The first unit of the MAPS was commissioned on July 23, 1983, and became commercially operational on January 27, 1984. The second unit has also become operational since September last.

Narora station: The fourth atomic power station to be commissioned in the country will be at Narora. It consists of two 235 MWe units. The budget provides Rs. 58.98 crores mainly for the procurement of equipment and for civil and electrical works. Work on the Narora project is going on in full swing.

The Kakrapar project in Gujarat consists of two 235 MWe units. The budget provides Rs. 81.08 crores for the procurement of equipment, and for civil, electrical and mechanical works.

The budget provisions for the coming financial year include Rs. 53.60 crores for advance procurement of materials and equipment for future atomic power projects.

/12851
CSO: 5150/0088

BRIEFS

BHABHA EXPLOSION DENIED--Bombay, March 15 (PTI)--Scientists at the Bhabha Atomic Research Centre today denied reports of an atomic explosion in the BARC premises recently. "There was no explosion or accident in BARC and the report is absolutely false," the director, Dr P.K. Iyengar, said. "The last atomic explosion we had was at Pokhran in Rajasthan in 1974," he added. The Janata Party member, Dr V. Venkatesh, had drawn the attention of the Speaker in Parliament during zero hour yesterday to a report that seven scientists were injured in the explosion in BARC a fortnight ago. [Text] [Calcutta THE TELEGRAPH in English 16 Mar 86 p 5] /9417

NUCLEAR POWER CORPORATION--New Delhi, March 19 (PTI & UNI)--It has been decided in principle to set up a nuclear power corporation, the minister of state for atomic energy, Mr Shivraj V. Patil, told the Lok Sabha today. He said in a reply to Mr Satyendra Narain Sinha during question-hour the details has yet to be worked out. India is now producing nuclear fuel just sufficient for its own needs, Mr Patil told Mrs Kishori Sinha. Nuclear energy: A target for generating 10,000 MW of nuclear energy by the end of the century had been fixed by the government, Mr Patil said. In addition to ongoing projects, setting up of two new atomic power stations each of 2 x 235 MW at Kaiga in Karnataka and expansion of the Rawatbhatta in Rajasthan had been approved during the seventh plan. [Text] [Bombay THE TIMES OF INDIA in English 20 Mar 86 p 16] /12851

CSO: 5150/0089

BRIEFS

COLLEGE OF NUCLEAR ENGINEERING--The College of Nuclear Engineering in Tajurah was opened this morning. A ceremony was held on this occasion which was attended by the secretary of energy and heads of diplomatic missions accredited to the socialist people's Libyan Arab Jamahiriyah. The opening ceremony was also attended by the secretary of the People's Committee of the College and the secretary of the Students' Congress. [Text] [Tripoli Domestic Service in Arabic 1230 GMT 14 Apr LD]

/12929
CSO: 5100/4609

PEACEFUL AIM REAFFIRMED TO INDIA

BK191122 Karachi Domestic Service in English 1005 GMT 19 Apr 86

[Text] Pakistan has once again categorically told India that its nuclear program was absolutely for peaceful purposes and that Pakistan has neither the intention nor the resources and capability for nuclear weapon program.

This reiteration was made by Foreign Secretary Mr Niaz A. Naik during his talks with his Indian counterpart, Mr Venkateswaran, in New Delhi yesterday. The question was raised in the context of discussion on the understanding reached between President Mohammad Ziaul Haq and the Indian prime minister, Mr Rajiv Gandhi, on the 17th of December last that neither side would attack each other's nuclear installations. Draft of the agreement to this effect was almost ready.

The foreign secretary said to demonstrate its seriousness Pakistan had made a number of proposals at international, regional, and bilateral levels to achieve the objective of keeping South Asia free of nuclear weapons. He wondered why the question was still raised in India that there is concern that Pakistan's program is not entirely for peaceful purposes. Strongly refuting the allegation, the foreign secretary said this highly organized campaign was just to malign Pakistan.

The foreign secretary said both sides agreed that mutual dialogue must continue and that the momentum of progress in normalization process which had slowed in recent past must be restored. Both sides agreed to propose possible dates shortly for the meetings for subcommissions in New Delhi and a joint commission meeting in Islamabad.

The two sides are also in the process of negotiating mutually convenient date for the second round of talks between the two defense secretaries to further take up their discussions (?on) Siachen Glacier. They accepted to meet in the second half of next month.

/9274
CSO: 5100/4743

SOUTH AFRICA

INTERNATIONAL CONFERENCE ON NUCLEAR WASTE PLANNED

Cape Town DIE BURGER in Afrikaans 4 Mar 86 p 3

[Article by our environmental correspondent: "Nuclear Power Countries To Meet in South Africa on Waste"]

[Text] Representatives of all the most important nuclear power countries in the West and possibly also representatives from behind the Iron Curtain will be in Cape Town in September of this year for a conference on radiactive nuclear waste disposal.

Sixty papers are expected to be delivered at the conference, 40 of them by speakers from abroad. The Atomic Energy Corporation of South Africa (AEK) is organizing the conference.

Minister of Mineral and Energy Affairs Danie Steyn will open the conference, which will run from 7 to 12 September. The main paper will be given by Dr. J. Rometsch, chief of the Swiss nuclear research unit. Among the speakers will be Dr. J.W.L. de Villiers, executive chairman of AEK.

The public is welcome to attend the conference.

The conference will primarily be concerned with the treatment and disposal of nuclear waste and with our own uranium and nuclear industry. The representatives will also visit South Africa's nuclear waste site in Namakwaland, Vaalputs.

Dr. Dennis Toens, chief of geology at AEK and convener of the conference organizing committee, said yesterday that the emphasis will be on the safe disposal of nuclear waste in dry regions.

"As far as we know, South Africa was the first country to select a site for the disposal and/or storage of radioactive waste before the country's first nuclear generating plant was placed in service. Vaalputs is one of the best-suited disposal facilities in the world," he said.

12593
CSO: 5100/17

SOUTH AFRICA

NUCLEAR CONTAMINATION OF FRENCH WORKERS DUE TO NEGLIGENCE

Cape Town DIE BURGER in Afrikaans 7 Mar 86 p 6

[Article by our medical correspondent: "Contamination at Koeberg, Four Workers Were Negligent--ESCOM [Electricity Supply Commission]"]

[Text] The four experienced French nuclear workers who were contaminated by radioactive cobalt in a radiation incident at Koeberg nuclear power plant on 20 February breathed in that radiactive material because they neglected safety rules and did not wear respirators.

ESCOM just announced this at a special press conference.

According to ESCOM the total radiation doses the four workers received were 12.8, 3.8, 6.1, and 0.5 millirem respectively. These are very small doses of radiation.

The highest dose (12.8 millirem) is equivalent to about one fourth of the dose that a human receives in a chest X-ray and is equal to the radiation received during a round trip flight between Cape Town and London.

The maximum permissible dose of radiation a nuclear worker can receive a year according to the strict South African regulations is 5 rem (5000 millirem).

High doses of radiation can lead to chemical alterations in the cell, damage of matter in the nucleus, and in the end to cell death. Medical research indicates that an acute radiation dose of 15,000 millirem is required before an alteration in the matter of body cell nuclei is observable.

The radiactive cobalt-60 breathed in should be broken down and expelled by the bodies of the four workers within 3 months.

Unnecessary

Although the four nuclear workers received small doses of radiation, it is ESCOM policy that nobody be exposed to more radiation than is absolutely necessary. According to ESCOM the incident was unnecessary. To prevent nuclear workers from becoming lax in regard to safety regulations, the investigatory committee recommended that workers should have to attend a course on radiation dangers and safety measures at least every 2 years.

12593
CSO: 5100/17

SOUTH AFRICA

BRIEFS

GOURIQUA NUCLEAR INSTALLATION DORMANT--A nuclear research installation is going to be built near the mouth of Gourits River, alhtough the area, Gouriqua, is just now being developed to offer the basic infrastructure for future research facilities. That is what the minister of mineral and energy affairs, Mr Danie Steyn, said yesterday in the Volksraad in reply to a question. He said no final decision has yet been made on the nature of the facilities which are going to be set up. "Due to present financial circumstances, the Gouriqua project can be virtually regarded as dormant. It is only of a sufficient size to productively employ the personnel who are already there." Mr Steyn said that before the ground was purchased a comprehensive environmental impact study was done and made available for the public's perusal in June of 1983. The study is being continued in consultation with consultants and universities. Further studies will be done as soon as a decision has been made on the specific facilities that are going to be set up. [Text] [Cape Town DIE BURGER in Afrikaans 26 Mar 86 p 3] 13084

CSO: 5100/20

U.S. SAID TO LET ISRAEL OBTAIN NUCLEAR ARMS MATERIALS

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 28, 29, 30 Mar 86

[Article by Vladimir Mikhaylov: "Hunt for the Bomb"; first four paragraphs are SOTSIALISTICHESKAYA INDUSTRIYA introduction]

[28 Mar 86 p 3]

[Text] ...In December 1957 a plant in Apollo (Pennsylvania, United States) obtained a federal permit to reprocess nuclear material and became the sole private enterprise specializing in the production of fuel for nuclear-powered submarines of the U.S. Navy. Ten years later it was discovered that 259.5 kilos of enriched uranium had disappeared from the enterprise in this time.

...On 18 November 1968 the ("Sheyersberg"), which had been carrying 200 tons of uranium, disappeared without trace on the high seas. A week later it suddenly docked in the Turkish port of Iskenderun. Its holds were empty.

...In November 1974 Karen Silkwood, lab technician at a plutonium-enrichment plant near Oklahoma City (Oklahoma, United States), discovered the puzzling disappearance from the enterprise of radioactive material. In accordance with a union assignment, the activist began her investigation. Setting out for a meeting with an official union representative and a reporter from THE NEW YORK TIMES, she had not driven 10 miles before her car lost control. Silkwood died.

These three incidents, which occurred at different times and in different places, were for many years not connected. It only recently became known that they were all the work of agents of the Israeli special service Mossad, which had from the country's leadership the mission of securing by any means the quantity of radioactive material necessary to produce nuclear weapons.

I. The Zalman Shapiro Stunt

In their relations with neighboring Arab states Israeli politicians and the Zionist military have always gambled on weapons. The "negotiations" and "good-neighborly relations" concepts do not exist for them: a continuous chain of provocations and aggression--this has been the essence of the entire policy of the Zionist state since the time of its formation.

The Zionists long since concluded that the creation of nuclear weapons could be the "ideal solution" of the Arab question. Israel met with the complete understanding and support of certain circles of a number of Western states. Plans, equipment, technology, raw material--everything necessary for the creation of nuclear weapons--were acquired by various paths and methods by the Zionist military and the scientists working for it. Naturally, these supplies were effected under conditions of the strictest secrecy, for which purpose the Mossad special service was equipped. It was instructed to consider work on the creation of an atomic bomb assignment No 1 and to spare no forces and resources for its accomplishment, stopping at nothing.

In 1958 an installation outwardly resembling a soccer ball appeared in the Negev desert, close to the small town of Dimona. This was a nuclear reactor, although the Israeli Government repeatedly attempted to persuade the public that it was merely a question of a "textile factory". However, this "factory" was guarded far more strictly than many important military facilities.

The territory surrounding Dimona for a radius of dozens of kilometers is encircled by a tight chain of guard posts with an abundance of both the most intricate electronics and specially trained guard dogs. All the airspace above this locale has been declared a prohibited zone. An incident is indicative: during a training flight an Israeli Mirage went off course and accidentally ended up in the Dimona area. There was no questioning whatsoever: the aircraft was shot down at once, and the pilot, who had managed to eject, was shot in the air.

Mossad embarked on fulfillment of its assignment even prior to the start of construction of the reactor. It was at that time that the license for the plant in Apollo was obtained. The request for it had been made at the initiative of Zalman Shapiro, president of the NUMEC Corporation. A well-known chemist and former employee of the U.S. research service and student of the notorious Admiral Rickover--the founder of nuclear submarines--Shapiro was a convinced Zionist, so Mossad knew to whom to turn. His name was well known in Tel Aviv inasmuch as the president of NUMEC had quite often performed the role of agent of the Israeli Defense Ministry.

Uranium began to go missing from the plant almost immediately following the start of its work for the U.S. Navy. In October 1960 even an employee of the Nuclear Regulatory Commission--the body which in the United States monitors the nuclear industry--sent Zalman Shapiro a letter in which he expressed concern in connection with the insufficiently strict supervision of radioactive material. The message said that the commission's inspectors had received information about a loss of enriched uranium from the plant.

In the summer of 1964 a commission inspection again turned up serious violations in accountability at the enterprise. The gaps in the inventories were so glaring that one of the inspectors sounded the alarm. He sent the leadership of the commission a telegram proposing urgent notification of the FRI about the regular losses of uranium. But the plant continued to operate tranquilly.

Finally, in the spring of 1965 the commission carried out a new thorough stocktaking. Its inspectors checked each figure in the accounts and questioned the consignees of products from the plant in Apollo. As a result the disappearance without trace of 80 kilos of enriched uranium was discovered. We would note for comparison that just under 10 kilos of this substance is sufficient for the creation of a low-yield atom bomb.

Shapiro was finally seriously taken in hand. He was questioned by officials of the commission and "confessed" that the missing material had mistakenly been "buried" in radioactive waste storage pits. The commission demanded that this waste be recovered immediately for analysis. But on a variety of pretexts for 6 months Shapiro evaded compliance with this demand.

On 25 September 1965 five high-ranking officials of the commission presented themselves to Shapiro with the official ultimatum: if he did not comply with their demands immediately, all the material on the president of NUMEC, the corporation itself and the management of the plant in Apollo would be handed over to the FBI and federal judicial authorities. Shapiro was forced to give his employees the appropriate instructions.

Work on the recovery of the waste and the analyses were completed only by the year's end. But sensing that his stunt was coming to an end and driven by the impatient demands of Israeli physicists, the president of NUMEC did his utmost. As a result only 7.25 kilos of uranium were discovered in the waste, but as of 31 December 1965 some 173.3 kilos had "disappeared" from the plant.

The commission investigation was headed by one of its executives--James Lovett. He prepared a voluminous report, whose facts and conclusions, according to Lovett's colleagues, automatically entailed the prosecution of Zalman Shapiro and his sentencing to a lengthy term of imprisonment.

But... the report was suddenly killed. Lovett himself declared that upon a closer familiarization with the facts he was unable to find confirmation that the uranium had been stolen. In his assertion, Shapiro had provided a perfectly satisfactory explanation for the disappearance of the radioactive materials. There is an interesting fact shedding light on the change in Lovett's position: some time later he quit the commission and took up not so much a responsible as highly lucrative position in NUMEC.

However, the scandal was heating up. The FBI and the Justice Department had taken up the case. The wheels of the machinery of the law had begun to turn, it seemed. Alas, this only seemed to be the case inasmuch as "mysterious forces" intervened in the course of the investigation, and 9 days later the investigation was ended. Whose intervention was this? Answering this question credibly is difficult, but it would not, I believe, be without interest to acquaint ourselves with two versions of what happened.

In the mid-1960's the CIA's technical service determined the existence in Israel of a laboratory working with a substantial quantity of enriched uranium. It was at approximately that time that the CIA's attention was attracted to regular exercises of Israeli jet aircraft. According to Carl Duckett, who was at that time CIA deputy director for science and technology, these specific maneuvers would make sense "only if they were practicing methods of dropping an atom bomb."

At the same time another CIA subdivision was analyzing the nuclear potentials of certain countries, including Israel. It also drew attention to the report on the nuclear laboratory. From where had the Zionist leadership, which lacked the complex and costly equipment for obtaining highly enriched uranium, been able to acquire a considerable quantity of this material?

Independently of one another, both CIA subdivisions came up with the NUMEC Corporation. They drew attention to Shapiro's frequent trips to Tel Aviv and the fact that since the start of the 1960's the stream of Israeli visitors to the plant in Apollo had been exceptionally great. The Israeli scientist Baruch Sinai and Ephraim Lahav, science attache at the Israeli Embassy in Washington, had gone there particularly often. Furthermore, Baruch Sinai had even been given temporary employment in NUMEC.

A tail was put on Shapiro in the United States and Israel. As a result the CIA drew the firm conclusion that Israel was obtaining radioactive material via NUMEC. It prepared a secret report, which, naturally, immediately came to the desk of Richard Helms, then director of the American espionage department. The latter headed for the White House and demanded a personal meeting with President Lyndon Johnson.

At the end of the audience Helms summoned his closest associates, including Carl Duckett. According to the latter, the CIA director reported that the President was emphatically opposed to any publicity for this affair and demanded that NUMEC not be impeded in its work. Johnson's wishes were carried out.

But there is also another version of how Helms' conversation with Johnson went. NEW YORK TIMES correspondent Tad Szulc, who was unanimously considered a major authority on questions connected with the CIA, conducted an independent investigation. He met and talked with a number of former agency officers who at that time held quite high positions and drew interesting conclusions. According to him, the U.S. President, who had received the CIA report the day before, had summoned Helms, intending to firmly demand that the material be handed over to the FBI and the judicial authorities and that it be examined in the U.S. Supreme Court. The President also intended delivering to Israel an emphatic protest against the piratical operations of its special services.

However, it was the CIA director who persuaded the President of the need to put a stop to this affair ("proceeding from the United States' highest interests") and afford Israel the opportunity to avail itself of American uranium in the future also. Helms assured Johnson that all Tel Aviv's work in the nuclear domain would be monitored by American intelligence and that the CIA would watch to ensure that it not be of a military nature.

...In 1967, when the quantity of stolen uranium constituted 259.5 kilos, Mossad resolved to close off this channel, in connection with which there had already been too much talk. With the help of the patrons of the Zionists it was possible to put a stop to the business without particular noise. Shapiro paid a fine for the "missing" uranium of the order of $1.1 million (not from his own pocket, naturally), sold the plant in Apollo and moved to another corporation. There also he continued to carry out Mossad assignments, recruiting scientists for work on technical projects of interest to Tel Aviv. However, the FBI's repeated attempts to begin his prosecution were frustrated owing to interference by the White House staff.

[29 Mar 86 p 3]

[Text] II. Operation 'Lead'

In the summer of 1967, despite the euphoria induced by the outcome of the "six-day war" which had gripped the Zionists, the Israeli leadership, particularly the military, were experiencing serious concern. They had not succeeded in achieving their goal of creating a "greater Israel from the Nile to the Euphrates" owing to the resolute position of the socialist community countries. Tel Aviv found itself in even greater international isolation. The question of uranium arose with new poignancy. And the Zionists resolved to switch to robbery in the full sense of this word.

Now, Robbery

On a hot August day in 1967 14 persons--the "surest of the surest"--had gathered at a top-secret meeting. They were all of like mind here and for this reason did not speak with reticence. But the person expressing himself the most candidly, perhaps, was then Defense Minister Moshe Dayan.

"We have conducted a brilliant operation," he began. "But for reasons known to you we have not been able to solve the Arab question conclusively. If we had had the Bomb, these 6 days would have been perfectly sufficient for us, and a stunned world, confronted with the fact, would have reconciled itself to what had occurred. But we do not have it yet. It is not my business to judge the actual contribution to the common cause of the valiant Mossad officers," he looked steadily at Meir Amit, head of the espionage department, "but, I believe, they were somewhat in haste in winding up the NUMEC operation. In a word, I propose entrusting the organization, which has shown its worth so brilliantly in all previous matters, with the procurement of new consignments of enriched uranium. How they handle this is, I believe, up to them. Stealing or taking by force--the details do not interest us."

The general took his seat. Some of those present nodded in agreement, some were plunged in thought, some looked searchingly at Meir Amit. But it would have been futile seeking in the faces of the statesmen an expression of embarrassment or shame, surprise or disgust. All of them, profoundly convinced that they were honest and decent people, accepted Dayan's proposal concerning theft or robbery as going without saying and containing nothing shameful.

The first action carried out by the Zionist saboteurs had been planned simply and without embellishment, recalling scenes from a Hollywood hit movie. Gangsters in cars blocked a 25-ton truck transporting uranium which belonged to the French Government. Having killed the guard, they drove the vehicle away, put the pursuers off the scent and in a secluded spot transferred the containers with the radioactive material to their transport. With forged papers, changing car license plates and small private aircraft, the group of Mossad agents delivered the uranium to a secret military base in the Negev Desert 2,000 miles from where it was stolen.

The group leader reported briefly to Meir Amit on the accomplishment of the first operation: "Freight taken. No losses." The chief of the special service reported back to the country's top leadership in the same words. No mention was made of the dead Frenchmen--what significance could their lives have for the representatives of "God's chosen people"?!

The first success inspired the gangsters from the big journey, who were blessed by Tel Aviv officials for their "exploits". Zionist agents scoured Europe, shadowing and bribing and recruiting informers connected with shipments of radioactive materials. Attacks on several "targets" had to be abandoned merely because the amount of the substance being transported was too insignificant. A further four-five operations were frustrated owing to sudden changes of route. Tel Aviv once again began to display nervousness.

Finally, the terrorists got lucky, it seemed. The journey of a truck carrying uranium to Britain was reconnoitered, and the freight was big enough to merit risks. Several persons connected with the shipments were bribed.

The operation went exactly as planned. A consignment of containers stamped "highly enriched uranium" arrived in the Negev Desert. But hereupon cruel disappointment awaited the Israelis. When their scientists surveyed the contents of the containers, they discovered that they held only uranium oxide. And inasmuch as the method of its enrichment was not at that time common practice in Israel, the entire dangerous and costly operation had, it transpired, been for nought.

Meir Amit was furious. His vaunted agents had been taken in like little boys. The specialists were urgently demanding uranium, and there was none. And the entire blame for this lay with Mossad. In headquarters analysts were drawing up a plan in accordance with which it would be possible to obtain a large consignment of nuclear materials at once. Meir Amit was assured that he could count on practically unlimited assistance on the part of both the military and the diplomats. The main thing: as rapidly and as much as possible.

The idea in general outline soon presented itself: this time the victim was to be a large merchant ship transporting uranium which was to be taken to an Israeli port. The "go-ahead" for this unprecedented act of international piracy was given by the prime minister of the Zionist state personally. The Mossad terrorists were given a conclusively free hand.

The 'Team' Is Assembled

The detailed elaboration and performance of the operation, which was codenamed "Lead," was entrusted to Mike Binder, leader of the "Special Operations" Department. He personally chose the future performers.

Meir (Azulay) had served at sea in the past and carried out Mossad assignments. He got to know people quickly, had an excellent memory and was a past master at handling explosives.

(Shauli) Mizraki, an officer of the "Arab Department," had "worked" repeatedly along spy department lines in Near East countries. He had a brilliant knowledge of several Arabic dialects and could, if necessary, pass for an Iraqi or Syrian, Libyan or Egyptian.

Siv Biran was on board on Israeli merchant ship far from his home shores. He was sent a telegram requesting that he come to Tel Aviv as quickly as possible and wait from day to day. He had an excellent knowledge of seafaring, and in the impending operation hopes were placed in him as an experienced captain.

(Reyven) Goldman had taken part in dozens of terrorist actions of the Zionist special services since the 1940's. He had so much rich experience that he could have outdone the chief himself.

"Communications expert No 1"--this was what Benny Arnheim was called in Mossad headquarters. It was claimed that he could assemble a radio transmitter from an ordinary matchbox and hairpin in 5 minutes.

And, finally, the sixth--the unprepossessing, puny-looking Gad Ullman was a very high-ranking and well-paid official in the civil service. But he was also the most fearsome person of the group chosen by Binder. None other than the Mossad leadership knew that he also had a second "profession"--assassin. When he was offered a "job," Ullman's face was lit up by a happy smile.

Having completed the selection of the performers, Mike Binder left for Brussels. A squalid little house in a suburb of the Belgian capital was the location of a secret address of Israeli intelligence, where Binder met an attractive young woman of the name of Sharon Manners--his agent. Binder began the conversation without any preliminaries:

"Consider, this job is possibly the most important of those in which you have participated. Your assignment includes close acquaintance with a person with an important position in Euratom with access to information concerning the shipment of nuclear materials. Here is a file on three of them."

Manners quickly glanced through the papers and photographs and put one folder aside: the Italian Antonio Bordini, assistant director for supply control.

...It was a dull day in the Belgian capital. Bordini, as always, drove to work in his brand-new Alfa Romeo. Leaving the car in the parking lot, he entered the Euratom building and went up to his office. A few minutes later a red Renault drove into the parking lot; behind the wheel was Sharon Manners. She drove up to Bordini's car, turned around and put the Renault sharply in reverse. There was a crunch of metal.

The guard, who until then had been dozing in his glass booth, ran up. Manners did not deny her blame and stated, showing the guard her papers, that she was prepared to make good the damage. While he was calling the owner of the damaged car, Sharon drove off, leaving with the "janitor" of the Alfa Romeo an apology note with her telephone number.

Bordini called the next day. A meeting ensued, then another. The Euratom official was charmed by his new acquaintance. And a few days later he made the acquaintance of Manners' old and good friend--"Paul"--Mike Binder. A large sum and Bordini's pro-Zionist sentiments served as sufficiently serious "arguments" for his recruitment. Part one of Operation "Lead" was completed successfully.

As of that time Sharon regularly handed over to Antonio envelopes containing money, obtaining in exchange packets containing papers, extracts and photocopies and Xeroxed copies of letters, telegrams and official communications. But Mike Binder had not yet found what was necessary for carrying out the plan.

About 6 weeks of tense waiting later Mike felt, glancing through the latest folder of copies made of documents stamped "top secret," the excitement of a hunter who has run to earth a wild animal. The papers mentioned the West German Asmara firm, which had signed a contract with the Societe generale de (minre) for the purchase of a large consignment of uranium.

Binder was attracted to this deal particularly because a coowner of Asmara was a certain Herbert (Shultsen). In the past "friends" from the CIA had recommended (Shultsen) to Mossad as a "reliable" person who could prove useful in matters of a delicate nature. Despite the fact that (Shultsen) had been a convinced fascist and had served in Nazi Germany's Luftwaffe in the war, the Zionist services had put him on the card index and even given him the nickname "Nazi pilot".

Agreement was reached with (Shultsen) rapidly. The final details of the plan were specified, circumstances enabling Asmara in the event of a scandal to emerge therefrom with the minimum moral losses were thought up and material compensation was stipulated.

The operation was organized on Asmara purchasing 200 tons of uranium in Belgium and dispatching it on the ("Sheyersberg"), which had been charted by (Shultsen), to Milan for enrichment and Mossad intercepting the ship with the cargo.

...A small ad concerning the sale of an auto-repair workshop carried in an Antwerp newspaper was dwarfed among the dozens of those like it. Therefore its owner, Emile Golder, was pleasantly surprised when a buyer came to see him. Paul, as he called himself, only gave the workshop, garage and yard a cursory inspection and did not haggle. But just a few hours later the attentive observer could have spotted entering the workshop gate a truck with a trailer carrying a 6-meter-long container carefully covered by a tarpaulin. Then a gray Peugeot stopped not far off out of which stepped two persons who plunged through the gate of the workshop. And about 15 minutes later a man and woman emerged from a Citroen which had driven up and headed in the same direction as their predecessors.

The "team" of Israeli terrorists had assembled: Mike Binder, Sharon Manners and four of the six.

The Raiders Had Competition

Meir (Azulay) and (Shauli) Mizraki were in Marseille. There they had to get on board the ("Sheyersberg") with forged papers, reach Antwerp, where loaded in a container onto the ship would be their "colleagues," then free them on the open seas and seize the ship. However, the operation had somehow become known to the mafia, which had decided to take possession of the precious cargo itself. Possibly for resale to Israel, but perhaps having obtained an order from someone else. One way or another, both saboteurs were intercepted, and their mutilated bodies were subsequently found on a Marseille garbage dump, while the competitors went on board the ("Sheyersberg") on their papers.

A few days later final preparations were under way in Antwerp for loading the containers with uranium onto the ("Sheyersberg"), which had arrived the day before. The moorage was brightly illuminated by searchlights, in the light of which sparkled the buttons of the port police officials surrounding the loading area. Numerous officials of Euratom's security service had taken up their positions, watching to see that no container left the confines of the port.

In the former auto-repair workshop all the preparations for the gangster action were complete. The container extricated from beneath the tarpaulin had been painted red and had all the Euratom markings. But inside it had been converted into a temporary "abode" of four saboteurs. Food, water, juice and even a small supply of whisky were to make their stay in the metal box if not pleasant, then not too agonizing. Every conceivable kind of instrument, guns, tear gas grenades and radio equipment had been packed into special compartments.

Everything was ready for the start of the operation, and while awaiting the signal each amused himself in his own way. Goldman played dice with himself. Manners polished her nails. Biran dozed, slumped in an armchair. Only Arnheim, perhaps, was busy. He was checking the communications equipment one more time, "sending" the receiver over various bands.

[30 Mar 86 p 3]

[Text] III. Shadow of the Nuclear Threat

Suddenly Arnheim pricked up his ears. Picking up some instrument, he switched it on, peered anxiously at the dancing pointers and headed for the truck. He surveyed it rapidly, then turned his instrument toward the Citroen standing alongside, opened the doors and began probing the seats. Beneath the rear seat he discovered a small box, tore off its lid, turned something there and only then began to say:

"A transmitter. Someone has been listening to our conversations and has followed Mike's movements in the Citroen. We have been tracked down."

Mike recovered his wits faster than the others. He quietly issued a few orders and put out the light, leaving only a small lamp burning in the workshop.

"Guests" were not long coming. There were six of them also. The silent clash in the dark lasted a matter of seconds. The dull thud of shots from guns with silencers, dim flashes, death rattles--this was all that told of what had happened. Seven corpses lay on the battlefield: all six attackers were killed, and the Mossad liaison, who had arrived at the height of the skirmish, was dead from a stray bullet.

...The truck bearing the Euratom emblem and the appropriate kind of container aroused no suspicions. No one had the least inkling of what the "foundling" could prove to be.

The next truck drove up. Its driver and Mike Binder, who had jumped down from the cab, neatly hitched up its ropes. A few minutes later the "Trojan horse" was in the holds of the ("Sheyersberg").

Robbery at Sea

On 17 November 1968 at 0548 hours the ship was given authorization to sail. At 0600 hours the ("Sheyersberg") cast off its moorings, giving the port a farewell blow on the horn.

All was as yet going smoothly. But experience of terrorist activity suggested to Binder that surprises are usually unpleasant and occur when they are least expected. And he decided to take additional precautionary steps which had been discussed in advance at the highest level.

Calling at the Israeli Embassy, Mike presented his credentials and demanded to be connected with the commander of the Israeli Navy. He uttered over the embassy radio the coded phrase in accordance with which the latter opened a secret package bearing the prime minister's seal. Having read the instructions contained therein, the old sea dog drew in his breath in amazement and admiration and thereupon issued the necessary orders. The Israeli Navy was put in a state of combat readiness in order following receipt of the signal to suddenly attack a peaceful ship on the high seas, destroy with aimed fire the radio mast to prevent the possibility of an SOS being given out and then, threatening the use of guns, seize the cargo.

This was a plan of an unprecedented brazen piratical attack and an act of international terrorism. But this did not disturb in this least a state which had adopted it in its foreign and domestic policy. And the fact that the attack did not take place was simply a matter of chance. The four Israeli saboteurs succeeded in "doing the job".

The day following departure, at 0010 hours, the terrorists heard above them cautious steps and hushed voices, which would approach and then move away. Someone was carefully investigating the hold. Who? Their friends? But, first, their release had been planned only for the following night and, second, their accomplices were to have given a prearranged radio signal, but Benny Arnheim had heard nothing, even though he had been listening constantly on two frequencies.

In the daytime, when all was quiet, they held a meeting and decided not to risk getting out of the container with their own powers. They cut out a hole with an autogenous welder and prepared themselves. In the evening the hatch cover was opened yet again. Two figures, clearly visible against the bright background, appeared. Gad Ullman could wait no longer: with a sensual smile he directed at the strangers the barrel of his Magnum with the silencer attachment and opened fire. Yes, these were the instants of his greatest delight--the moment of murder.

The four armed gangsters, who attacked suddenly, had no particular difficulty in seizing the peaceful ship, for which this trip was only a normal voyage with cargo. Submitting to the order, the ("Sheyersberg") put up in the small bay of an uninhabited island, where with the help of window dressing and paint it was converted into the "Kerkyra" with a different configuration and coloring.

Under the Liberian flag the "Kerkyra" entered the Israeli port of Haifa late in the evening. It was expected, and it was urgently led off into a secluded dock, around which a reinforced guard was immediately posted. And the following night the former ("Sheyersberg") left Haifa with lights extinguished and headed for the Turkish port of Iskenderun. It arrived there a day later. Having undergone the customs formalities, the team, at full strength, left the ship, whose holds were empty, and went into the city.

Who Killed Karen Silkwood?

The American Karen Silkwood had dreamed of a career in science. She had been involved in science, but marriage and the birth of a child, which are natural for every woman, had torn her away from her beloved work. Therefore when, in 1972, she succeeded in finding a job as a lab technician at a uranium-enrichment plant of the Kerr-McGee Corporation not far from Oklahoma City, she considered that it was her great good fortune. And she would have continued to work there so long as the corporation was satisfied with her work were it not for....

In 1974 Karen called attention to a whole series of accidents on the job. And inasmuch as she was not indifferent to the fate of her comrades and had already become a union activist, Silkwood took up this question. Her comrades trusted her, and she was soon elected to the supervisory council of the local of the International Oil, Chemical and Atomic Industry Workers Union. It was then that she began the investigation in earnest.

Surprising things came to light. In a few months she had in her possession a thickish file containing evidence not only of a disregard for equipment safety rules at the enterprise, fictitious analyses of radioactive fuel and forged documents concerning its quality but also of the puzzling disappearance of plutonium from the plant.

A few words should probably be said about the Kerr-McGee Corporation, where Silkwood worked. In the United States it is called a "giant" of the energy industry, which has for more than half a century dominated the business and political world of the state of Oklahoma.

And Karen Silkwood discovered the secret routes by which the plutonium was leaving the United States. And it was taken directly to the nuclear reactor in Dimona. She had seemingly gotten too close to the carefully protected secrets of the Zionists and the Pentagon. For this reason she had become for them a "dangerous witness". The more so in that it had become known from telephone conversations bugged by the special services that Silkwood intended meeting with an official union representative and a NEW YORK TIMES correspondent. Karen assured them that she would talk not only about "the strange happenings and goings-on" at the plant of the Kerr-McGee Corporation but also back up her story with the irrefutable documents in the file which she had compiled.

This communication was the final straw following which it was decided to "remove" Karen. Everything had been precisely calculated. She had to drive only 30 miles (1 mile = 1.6 kilometers) to the place of the meeting, but Silkwood's car did not get one-third of the way even. Losing control, she sped down the highway embankment and smacked into the concrete wall of a viaduct. Karen died instantly, and pages of the file were scattered in the red Oklahoma dirt. The state highway police officer who was the first to arrive at the scene of the accident indicated in the report that he gathered up the papers and put them in the trunk of the totaled vehicle. But, however, the next day these papers were not there: they had vanished without trace.

The FBI hastened to declare that Silkwood was a drug addict and that the accident had occurred through her own fault after she had taken a drug overdose. The questioning of witnesses who had known Karen and the results of the autopsy refuted this statement. Then came something new: the car had not been serviced in a long time, and as a result the steering mechanism had failed. Experts who inspected the automobile did not agree with this assertion by the police either.

More, they expressed the belief that the catastrophe had occurred as a consequence of "a heavy hit in the front left door from the outside." There were also witnesses who declared under oath that on 13 November 1974 on Highway 74 the car driven by Karen Silkwood was being pursued by an unknown automobile with four men inside. It was clear: it was no accident but a cold-bloodied, calculated murder.

The U.S. Justice Department "responded" to this evidence in its own way. The case was ordered closed and all material of the investigation consigned to the archives. Silkwood's friends and colleagues, who have managed in this time to unearth many details, have not succeeded in finding the murderer, although they are firmly convinced that behind this crime against the union activist stand the special services of the United States and Israel.

Fruits of a Dangerous Alliance

...On 22 September 1979 at 0300 hours local time an American a U.S. Air Force Vela reconnaissance satellite in the South Atlantic-Indian Ocean region registered a double light flash. Both the CIA and the Pentagon concluded that this was a test of a 2-3-kiloton nuclear bomb. And citing informed sources, the British television program World in Action claimed that a nuclear device developed and manufactured by Israel in conjunction with South Africa had been exploded over the Kalahari Desert.

Thus culminated the racist-Zionist nuclear alliance which had emerged back in the mid-1960's. There had been a number of meetings at that time of high-ranking Mossad representatives and their colleagues from South Africa, in the course of which the need for the creation of a Tel Aviv-Pretoria "nuclear axis" was recognized. This agreement acquired new directions in all subsequent years, and ultimately the roles were allocated thus: Israel made available to South Africa nuclear technology, technical personnel and nuclear weapon delivery systems developed with the assistance of Western, primarily American, allies or stolen from them; in turn, South Africa supplied uranium to the Zionists and also, inasmuch as difficulties had arisen for the latter concerning the territory where nuclear devices might be tested, made available to them a proving ground, more precisely, Africans' land.

The first fruit of this dishonorable alliance was the testing of a jointly manufactured bomb at the end of 1979. Today, however, we may assert with confidence the following. Both countries have nuclear weapon delivery systems: jet bombers, missiles and 155-mm howitzers. Both Tel Aviv and Pretoria have nuclear reactors operating on uranium suitable for the production of nuclear weapons. As far as arsenals thereof are concerned, nothing can be said about them with complete certainty, naturally. Reports testifying to the existence of such filter through into the press now and again, it is true. Figures are cited--from a few warheads to 200. This is understandable: such information is in the category of the most guarded state secrets.

But ultimately it is not a question of how many bombs and of what yield the South African racists and Israeli Zionists are prepared to drop on their neighbors, and they could do this now or in a short time. The main thing is that in their identically fascist, antihuman essence, in their assertions concerning the "exclusiveness" of their race and in their hatred of national liberation movements they are prepared to do this. Through the fault of imperialist circles and the West's monopolies the shadow of the nuclear threat today looms over the Near East and South Africa.

8850/9869
CSO: 5100/13

TASS CITES U.S. REPORT ON NEED FOR U.S.-USSR INTERACTION

LD042037 Moscow TASS in English 1952 GMT 4 Apr 86

[Text] Washington 4 April TASS--TASS correspndent Igor Borisenko reports:

Interaction of the USA and the USSR in the consolidation of the nuclear non-proliferation regime is desirable and possible. This report entitled "Blocking the Spread of Nuclear Weapons: American and West European Perspective" which has been drawn up by influential public organisations: the council on Foreign relations and the Centre for European policy studies.

Calling for the consolidation of the nuclear non-proliferation regime, the authors of the research emphasize that both the USSR and the USA are interested in preventing the spread of nuclear weapons. Even in the times when relations between the two countries were strained, the Soviet Union strongly declared in support of the non-proliferation regime and was manifesting the readiness to hold consultations on these problems, it is stressed in the report. The authors of the report believe that interaction of the USSR and the USA in the matter will make it possible to keep the door open for a Soviet-American dialogue on other important matters, specifically on problems of nuclear arms control. It is emphasized in the survey that a comprehensive test ban would be a considerable contribution to the consolidation of the nuclear non-proliferation regime.

At a press conference in connection with the publishing of the report, former head of the U.S. delegation to the Salt-1 talks Gerard Smith emphasized that ending of the arms race and ban on nuclear tests would be the only reliable barrier to nuclear weapons spread. He criticized the non-constructive stand of the U.S. Government in the matter of the moratorium on nuclear explosions. In this connection he declared that the Star Wars programme is the main problem blocking progress at the talks on arms control. The programme contradicts the aims of nuclear non-proliferation, he said.

/12913
CSO: 5100/14

FRANCE

BRIEFS

NUCLEAR REACTOR ISSUE--Paris, April 22 (AFP)--France has proposed resuming discussions with Israel on supplying a nuclear reactor, on condition that Paris is allowed to replace a reactor in Iraq destroyed by Israel in 1981, informed sources said here Monday. The Israelis destroyed the French-built Osirak reactor of Iraq's Tamuz-1 plant on June 7, 1981, fearing that Iraq had the potential to develop a nuclear bomb. Mr. Peres, who arrived here Monday, would not comment on the report after he held talks with Prime Minister Jacques Chirac. The sources noted that the French proposal, in addition to political considerations, would pose financial problems. [Text] [Paris AFP in English 0653 GMT 22 Apr 86 AU]

/9716
CSO: 5200/2678

NUCLEAR REGULATORY AGENCY REPORT: SAFETY RECORD GOOD

Stockholm SVENSKA DAGBLADET in Swedish 24 Dec 85 p 6

[Text] Increased proficiency and measures improving safety at Swedish nuclear power plants mean that the risk of serious nuclear accidents is now considered to be lower than it was felt to be in the evaluations made at the end of the 1970's.

On the other hand, the probability of a serious accident has not dropped so low that the possibility of a serious breakdown can be ignored.

So writes the Nuclear Power Inspection Board (SKI) in a report to the government concerning the risk of radioactive releases during serious nuclear accidents. The report also recommends improved protection at the nuclear power plants in Ringhals, Oskarshamn, and Forsmark.

"Know More"

According to the TT [PRESS WIRE SERVICE, INC.], Lars Hogberg, a manager at the SKI, commented on the report by saying: "The probability of a nuclear accident has dropped. We believe that we know more now than we did before."

Filter Installations

The report to the government also includes proposed guidelines for measures to improve safety at the nuclear power plants in Ringhals, Oskarshamn, and Forsmark. The measures are aimed at limiting radioactive releases if a big accident should occur despite everything.

It was decided in 1981 that a filter installation would be built at Barseback to reduce the effects on the surroundings if a meltdown should occur. That facility (Filtra) was completed in November 1985.

The same decision called for similar measures to be taken at the other nuclear power plants.

"And that decision still holds good," says Lars Hogberg. "But there may be smaller facilities than Filtra and combinations of various measures."

At Forsmark and Oskarshamn 3, those measures will include strengthening reactor containment. All reactors will then be equipped with safety valves having precipitation devices to limit possible releases during an accident.

Possible Measures

In 1985, according to the SKI, the State Power Board and the Oskarshamn Power Group reported on comprehensive studies concerning the risk of accidents and also proposed possible measures for reducing the effects of serious accidents.

Those studies have been examined by the Institute of Radiation Protection and the SKI. The report to the government also proposes requirements in connection with the technical solutions that will be produced by the power companies.

The SKI also wants the government to confirm the guidelines that have been set up. In addition, the SKI wants to study and approve technical solutions presented by the nuclear power companies in 1986.

11798
CSO: 5100/2518

WEST GERMANY'S KRAFTWERKUNION TO SUPPLY STEAM UNITS

Stockholm SVENSKA DAGBLADET in Swedish 29 Mar 86 p IV

[Article by Dag Bjerke]

[Text] West Germany's KWU (Kraftwerkunion) has been awarded the State Power Board's order for the three new steam generators for the Ringhals 2 nuclear reactor. This means that Westinghouse of the United States did not get a chance to play a return match.

The order totals 240 million kronor, about 30 percent of which may return to Sweden in the form of subcontracting. Sandvik, for example, will be responsible for the 275 kilometers (!) of finger-thin tubing with which the cans will be filled.

It was those tubes which rusted away in the trouble-causing steam generators originally supplied in the mid-1970's by reactor manufacturer Westinghouse.

"This time we chose another material for those tubes, and in addition, the critical assembly on the foundation slab is designed in a different way," says Sven-Erik Rosen, the State Power Board's project manager for the replacement.

On the question of whether Westinghouse was excluded because of poor quality or excessively high prices, Sven-Erik Rosen answered in a hesitating manner:

"We had about 20 different factors to take into consideration, and all things considered, Westinghouse did not meet the requirements."

The KWU, a subsidiary of Siemens, has about 40 steam generators of the same type as those now ordered for Ringhals 2 in service at various installations. According to the State Power Board, experience with them has been very good.

Other competitors eliminated in the bidding were Babcock & Wilcox of Canada and FRAMATOME of France.

11798
CSO: 5100/2518

ASEA ATOM EXPECTS APPROVAL TO EXPORT NUCLEAR GEAR TO FINLAND

Stockholm DAGENS NYHETER in Swedish 9 Apr 86 p 10

[Article by Ake Ekdahl]

[Text] All indications are that the Swedish Government will approve the export of nuclear equipment to Finland if ASEA-Atom manages win such an order in competition with the Soviet Union.

Swedish legislation is quite clear on that point. Nor does the government need to fear any political storms if it makes such a decision. Only the environmental movement, supported by the VPK [Left Party-Communists] and possibly the Center Party, would protest.

Minister of Energy Birgitta Dahl thoroughly discussed nuclear exports the other day with spokesmen for the environmental organizations, and she made it clear that the government had no plans to tighten legislation.

The current deal with Finland was not discussed specifically, and no advance information has been provided to the nuclear industry by the government.

Following the referendum in which it was decided that Sweden would have no more nuclear power by the year 2010, exports of Swedish nuclear technology became as morally sensitive as arms exports.

Sweden's legislation on exports dates from 1958, but it has been revised several times, most recently in 1984, when it was tightened up with the new Law on Nuclear Technology. Now the government itself establishes all the requirements for permission to export nuclear technology. There is a list of products covered by the law.

Each case is examined individually, and that examination must take Sweden's international commitments and the risk of the spread of nuclear weapons into account. The stricter rules also cover the transfer of technical know-how.

The Center Party and the VPK had introduced bills calling for a ban on exports.

By an overwhelming majority of 249 votes to 66, Parliament rejected a law banning nuclear exports as far back as the spring of 1983. The fact that Ambassador Maj Britt Theorin abstained from voting attracted some attention.

The Conservatives are zealous advocates of nuclear exports and want to sell the Secure thermal reactor. The Center Party was willing to exchange nuclear power for petroleum in Mexico in 1980, and the Liberal Party had plans to export nuclear power to Turkey the year before that.

Swedish export deals with Iraq, Brazil, and India have also come up for discussion. As a rule, the Non-Proliferation Treaty (NPT) has blocked the conclusion of such deals.

The Center Party does not intend to push its demands for a ban on nuclear exports at present. The government feels that it has no need to be ashamed of its energy decisions and points to the law permitting exports to countries that are not controversial.

The criticism comes from the VPK and the environmental and antinuclear movement.

"How can a Swedish government support the expansion of nuclear power in a neighboring country?" asks Conservative Member of Parliament Per-Richard Molen, an executive from Sundsvall. He wants Prime Minister Ingvar Carlsson to answer that question. After all, a Swedish government that is working so actively to phase out nuclear power in Sweden should not be helping in the sale of reactors to Finland.

11798
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END

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13 JUNE 1986

Worldwide Report

NUCLEAR DEVELOPMENT AND PROLIFERATION

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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AUSTRALIA

BRIEFS

JAPAN URGED TO BUY MORE URANIUM--The prime minister, Mr Hawke, has urged Japan to more than double its intake of Australian uranium within 2 years. He made the request in Tokyo where he is spending 5 days discussing trade issues with Japanese leaders. Japanese officials say Mr Hawke met the international trade and industry minister, Mr Watanabe, and asked Japan to raise its share of Australian uranium exports from the present 13 percent to 30 percent by 1988. The increase would be timed to coincide with the start of production at the giant Roxby Downs uranium and gold mine in the far north of South Australia. According to Japanese officials, Mr Watanabe wanted Australia to remain a stable uranium supplier from a national security standpoint, but he did not make any specific commitment. Japan has contracted to import a total of 190,000 tons of uranium from Australia by the mid 1990's. Mr Hawke also said he had received assurances from his Japanese counterparts, Mr Nakasone, that Japan will not enter into any bilateral mineral trade agreement that would damage Australia. Australian officials in Canberra are reported to have been concerned that Tokyo was preparing to strike a deal with the United States on coal imports. [Text] [Melbourne Overseas Service in English 0830 GMT 17 May 86 BK] /6662

CSO: 5100/4305

JAPAN

REAGAN, KOHL DISCUSS NUCLEAR SAFETY, TERRORISM

OW040804 Tokyo KYODO in English 0743 GMT 4 May 86

[Text] Tokyo, May 4 KYODO -- U.S. President Ronald Reagan and West German Chancellor Helmut Kohl agreed Sunday that it is necessary to establish international standards for safety in nuclear reactors, West German Government spokesman Friedhelm Ost said. The two leaders agreed that the Chernobyl nuclear power plant accident in the Soviet Ukraine was an international issue, and that coordinated action is necessary.

In discussions on international terrorism, Reagan advocated coordinated action to isolate Libyan leader Colonel Mu'ammar al-Qadhdhafi by cutting his contacts in various fields. Kohl said that West Germany will take steps to tighten security for U.S. forces based there.

On arms control, the two sides discussed returning chemical weapons stored in West Germany to the United States. Spokesman Ost said that negotiations are ongoing, but made no further comment.

Speaking on trade policy, Reagan said he would like to make a new GATT round one of the major issues at the summit because of protectionist tendencies in the U.S.

/9274
CSO: 5160/054

CABINET MEETS TO REVIEW RADIATION REPORT

AFP Report

HK040352 Hong Kong AFP in English 0327 GMT 4 May 86

[Text] Tokyo, May 4 (AFP) -- The government convened an emergency cabinet meeting Sunday after Japanese scientists said they had detected abnormally high radiation levels in central Japan, officials said. The Science and Technology Agency identified the radiation as Iodine 131, and agency officials said they believed it was linked to the Chernobyl nuclear plant disaster in the Soviet Union eight days ago.

The radiation was detected in rain water samples in Tokyo, Kanagawa and Fukui Prefectures, but agency officials said the levels were not high enough to be harmful to human beings.

The cabinet meeting was expected to study the report and detail immediate counter-measures against the radioactive contamination, the officials said.

The agency, in another report, said drinking water, food and soil sampled by the Japanese Embassy in Moscow were found also to have been contaminated by radioactivity. The Moscow samples contained similar radioactive substances to those found in the tests carried out in Japan, but except for that of the soil, the contamination was not believed to be dangerous to the human body, agency officials said.

The U.S. Presidential spokesman said that the United States delegation headed by President Ronald Reagan here for the seven-nation economic summit had been informed of the findings of the Japanese scientists. Specialists and scientists had attended the Japanese Cabinet meeting which was held at 7 a.m. [2200 GMT Saturday], the spokesman, Larry Speakes said. He added that the Japanese had said that there was no danger for human beings in the levels detected but that people had been advised not to drink rain water and not to wash their vegetables in rain water.

Government Announcement

OW040528 Tokyo KYODO in English 0335 GMT 4 May 86

[Text] Tokyo, May 4 KYODO -- Radioactivity scattered by the Soviet Chernobyl nuclear reactor meltdown has reached Japan, and contaminated rain fell in Tokyo, Kanagawa and Chiba Prefectures Saturday, the government announced. The announcement followed an emergency cabinet-level meeting Sunday morning following a report of the contamination of rain water sampled Friday and Saturday.

The level of the contamination is said to be harmless to the human body. But the detection came as a shock to the government, which had declared that Japan, 8,000 to 9,000 kilometers from the Soviet nuclear mishap in the Ukraine, would be free from radioactive fallout from the accident.

The nuclear reactor meltdown is now thought to be of a much greater scale than was originally believed, and the fallout may have covered the entire northern hemisphere, scientific observers said. Dust sampled from the atmosphere in Fukui Prefecture was also found to have been contaminated by radioactive substances.

According to the announcement, the rain water samples contained radioactive iodine 131, with readings in picocuries (a on trillionth of curie) per liter of 4,000 in Chiba, 1,700 in Tokyo and 263 in Kanagawa. In Fukui, the reading was 0.13 picocuries per cubic meter of dust floating in the air and 690 per cubic meter of fallen dust.

According to Science and Technology Agency officials, the contamination levels are so low, however, that a person would have to drink an average of 2.2 liters of the rain water that fell over Chiba every day for the next six months before it went beyond the tolerable level.

The Science and Technology Agency first received reports of the detection of iodine 131 after 1 a.m. Sunday from the Kanagawa Prefectural Hygiene Office. Later, the agency learned that sanitation officials of the Tokyo Metropolitan Office and Chiba Prefecture also had similar reports.

Yohei Kono, director general of the agency and a member of Prime Minister Yasuhiro Nakasone's Cabinet, received the formal report from his office at 5 a.m. Sunday. He called for an emergency meeting at 7 a.m. Officials of the Health and Welfare Ministry and the Meteorological Agency were summoned to the meeting. Kono said the radioactive iodine detected was not in amounts large enough to be harmful, but assured the nation that the government will continue to watch.

A senior official of the agency, meanwhile, admitted that he did not expect iodine 131 would appear in Japan so soon after the Chernobyl nuclear plant disaster. He said milk and vegetables are safe, but advised consumers to fully wash vegetables before they eat them.

White House spokesman Larry Speakes briefed American news reporters on the Japanese reports, assuring them it is safe to drink local tap water.

Japanese Government officials earlier believed that the Soviet nuclear power plant accident would not affect Japan. They said the radioactive substances released from the plant would have a hard time reaching the jet stream traveling 2,000 kilometers north of Kiev at an altitude of 10,000 meters. They also said that nuclear fission materials normally dissipate before they get to the upper atmosphere.

A Japanese scientific expert said he believed the amount of radioactive substances emanating from the Ukraine accident appears to be much more than that detected following America's Three Mile Island nuclear accident in 1979. He expressed the belief that the Soviet accident might have been far more worse than has been believed. The reports on the finding of iodine 131 came in the midst of a holiday-studded "golden week" in Japan, a time when many Japanese are on the road traveling to resort areas.

Weathermen across the nation have been showered with telephone calls inquiring about rain. Rain has been falling over much of Japan in the past two days, except for northern and western parts of the country. The Weather Bureau forecast that the rainy weather will continue for the next few days.

In another related development, the Foreign Ministry said it has instructed its embassies in the Soviet Union and Poland to advise Japanese nationals to take precautionary measures. The measures included voluntary restraints on travel to the Kiev area and a survey on whether Japanese citizens in the area have been affected by he accident.

The Foreign Ministry has also advised Japanese nationals not to drink milk and wash vegetables and fresh fruit.

/9274
CSO: 5160/052

JAPAN

OFFICIALS DISCUSS AFTEREFFECTS OF USSR NUCLEAR ACCIDENT

Government Responds

OW300423 Tokyo KYODO in English 0411 GMT 30 Apr 86

[Text] Tokyo, April 30 KYODO -- Japanese Government officials met Wednesday to discuss measures to deal with the aftereffects of a Soviet nuclear power plant accident. The meeting, decided to ask the Air Self-Defense Force to dispatch F-4 Phantom jetfighters to collect dust to determine whether nuclear radioactive fallout had reached Japan following a major accident at Chernobyl power plant north of Kiev in the Soviet Ukraine.

Officials of the Science and Technology Agency, the Ministries of Foreign Affairs, Agriculture, Forestry and Fisheries, Transport, and Defense, and Central Meteorological Agencies attended the Wednesday morning session, but admitted they did not have details on the accident. The accident at the Soviet nuclear power plant reportedly occurred on April 26.

The government instructed the Japanese Embassy in Moscow to obtain correct information. At the same time, officials asked the Soviet Embassy in Tokyo to release details on the accident, which was said to be far worse than another serious accident that occurred at the Three Mile Island power plant in the United States in 1979. Japan has also said it is ready to offer technical assistance if the Soviets ask for help. The Soviet Government has already applied for help from West Germany and Sweden.

Foreign Ministry sources, however, said that as of Wednesday morning the Soviet Government had not sought Japanese assistance for the accident. They said the latest mishap could have a major effect on Soviet foreign policy since it occurred shortly after Soviet leader Mikhail Gorbachev consolidated his domestic power base at the party convention in February.

The Natural Resources and Energy Agency set up a task force Wednesday morning and directed electric power companies to step up their safety measures for operating nuclear reactors. Japan has 31 nuclear power plants in operation, compared to 43 in the Soviet Union, which is currently the world's third largest nuclear power plant operator following the United States and France. The nine electric power companies which supply electricity across Japan, meanwhile, expressed concern about the unfavorable effect the Soviet accident will have on their power plant construction plans.

ELectricity generated by nuclear power is less expensive than electricity generated by fossit fuel according to the electric companies, which would like to increase dependence on nuclear power plants. About 30 nuclear power plants are under consideration for construction, 18 of which have already been approved by the Ministry of International Trade and Industry (MITI). The foreign ministry said 127 Japanese tourists were believed to be visiting Kiev as of Tuesday. But officials said they were not certain whether the tourists were in Kiev when the power plant accident occurred. The Soviet Government has issued a ban on travel to Kiev following the accident.

Public health officials in Kyoto and Osaka said no unusual amount of radioactivity had been detected as of Wednesday morning. Chief Cabinet Secretary Masaharu Gotoda said the Japanese Government is intently interested in the soviet accident.

Japan Air Lines said it checked two jets that made stops in Moscow Tuesday in flights between Tokyo and Europe, but found no traces of radioactivity. One flight arrived in Narita from Paris and the other arrived in London from Narita Tuesday. Prime Minister Yasuhiro Nakasone told news reporters that the Tokyo summit of seven industrially advanced democracies May 4-6 may take up the issue of the Ukraine power plant accident. He said he had no new information.

Public 'Shocked'

OW300241 Tokyo KYODO in English 0223 GMT 30 Apr 86

[Text] Fukui, April 30 KYODO -- Residents in Fukui, the prefecture with the highest concentration of nuclear power plants in Japan, Wednesday reacted with shock to reports that more than 2,000 people died in the Soviet nuclear accident. "We can't say 'it is not our business'", Miwako Ogiso, leader of a local anti-nuclear movement said. Ms. Ogiso pointed that Fukui houses 11 of the 32 nuclear power plants in operation in Japan, the largest concentration in the country. "I can picture what it looks like -- hell," she said when told there were unconfirmed reports that 2,000 people had died because of the accident in the Chernobyl nuclear plant.

"Nuclear power is no longer safe," said Jinzo Isobe, leader of a local plaintiff group which has filed a suit to stop the development of fast-breeder nuclear reactors in Japan. Ms. Ogiso said her group plans to urge the local authorities to order a safety check of all nuclear plants in Fukui prefecture and review disaster contingency procedures.

The Natural Resources and Energy Agency says it has ordered nation-wide monitoring to check for possible increases in radiation levels, but an official in charge of atomic energy safety predicted there will be very little effect on Japan from the Soviet radiation leak. Meanwhile, radiation levels at Fukushima prefecture, north of Tokyo, are normal four days after the accident, the Fukushima prefecture atomic power center said Wednesday. The center has stepped up monitoring of radioactive fallout at the instruction of the Science and Technology Agency, a center spokesman said. He said the center, which has 18 monitoring stations in the prefecture, will file reports about radiation levels to the agency daily instead of monthly as in the past.

There are two nuclear power stations in the prefecture with maximum protection capacity of eight million kilowatt-hours, the largest in any single prefecture.

No Request for Assistance

OW300233 Tokyo KYODO in English 0222 GMT 30 Apr 86

[Text] Tokyo, April 30 KYODO -- Japan, a leading operator of nuclear power plants, has not received any formal request from the Soviet Union to help fight a deadly fire at a malfunctioning nuclear power plant near Kiev, a Foreign Ministry official said Wednesday. He said the Japanese government has no immediate plan to send officials to the Soviet Union to keep tabs on developments concerning the nuclear accident.

Both the Japanese Government and the nation's nuclear power industry sent groups of experts to the United States at the time of the Three Mile Island nuclear power plant accident in 1979.

Information gathered by the Japanese Government so far is sketchy, the official said, adding the government will convene an emergency meeting of government officials shortly to deal with the crisis.

/9274
CSO: 5160/049

INTOURIST WARNS OF RADIATION FROM CHERNOBYL

OW130301 Tokyo KYODO in English 0211 GMT 13 May 86

[By Shiro Yoneyama]

[Text] Tokyo, May 13 KYODO -- Intourist, the official Soviet travel agency, has sent a telegram to Japanese travel agents warning that foreign tourists in the Soviet Union may be "absolutely endangered" from nuclear radiation. The message, signed by Intourist President Valentin F. Lebedev, explains the April 26 blaze at the Chernobyl nuclear power plant and subsequent developments in unusual detail.

"Special medical examination of tourists in the USSR has shown that none of them has been affected by radiation," Lebedev said in his statement. A copy of his telegram was made available to KYODO news service Tuesday.

"Foreign tourists may travel throughout the USSR visiting any tourist centre [without] being absolutely endangered." Japanese travel industry sources interpreted Intourist's conflicting message as suggesting that the aftereffects of the nuclear disaster have been far worse then the Soviets have claimed.

The telegram, apparently cleared by Soviet authorities, said that two people died and "204 persons have been hospitalized with 100 persons among them subjected to radioactive contamination in certain degree; 18 persons are seriously sick." Japanese travel firms received the message from the state-run Soviet travel agency at the same time as a high-level delegation from the International Atomic Energy Agency was in the Soviet Union on a fact-gathering mission.

Four Japanese engineers returning from Kiev earlier this month were found to have been exposed to radioactivity leaked from the stricken nuclear power plant. Of 123 tourists from Japan who were in the Soviet Ukraine at the time of the Chernobyl accident, 118, including 12 Americans and six other foreign residents in Japan, underwent tests upon arrival here, a Foreign Ministry official said.

The official said 45 Japanese were found to have been exposed to radioactivity, with at least one of them suffering from 590 milirems of radiation -- the danger level is said to be 3,000 milirems. Some tourists were forced to give up contaminated belongings and clothes.

/9274
CSO: 5160/062

NHI INTERVIEWS CPSU'S KAVALENKO ON CHERNOBYL

OW151311 Tokyo NHK Television Network in Japanese 1206 GMT 15 May 86

[Interview with Ivan Kovalenko, deputy chief of the International Department of the CPSU Central Committee, who is currently visiting Japan at the JSP's invitation, by NHK reporter Iida -- recorded; time and place of interview not given; interview conducted in Russian, with Japanese translations provided in subtitles; the following text is from the Russian version]

[Text] [Iida] Ivan Ivanovich, Japan as well as some other Western countries have seriously criticized the Soviet Union for the long delay in informing those countries that were affected by the Chernobyl accident about what had happened there.

[Kovalenko] I understand. To say that we waited a long time to come out with a report is not true. True, there was a 2 to 3 day delay, but no more.

When the accident happened, the local authorities thought that the accident was of a local character and that they could cope with the accident through their own efforts. When it became clear that the accident was more serious and that more serious consequences were involved, they informed the central authorities -- the government -- about what had happened, and our government immediately publicized what had happened at the Chernobyl AES, announcing that a serious accident had happened. That was the first report. After that we informed the UN secretary general as well as the IAEA, the international agency monitoring the peaceful uses of nuclear energy.

[Iida] It seems to us that the approach toward issuing reports or the concept of issuing reports in the Soviet Union differs from the approach of Western countries. What is your view?

[Kovalenko] Indeed there is a difference. We only report what is true, and for this reason our reports are reliable ones. We stand by our reports. Westerners are pursuing sensationalism bordering on provocation and are publishing all kinds of cock-and-bull stories and thus confusing international public opinion. This is why I agree with you. We have a broad plan for the construction of AES's.

The energy resources are growing smaller and smaller in the world. The use of nuclear power for peaceful purposes is a long-term and necessary thing caused by the needs of further scientific-technical progress, development of the economy and national economies of various countries. I repeat, however, nuclear energy must be used only for peaceful purposes.

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CSO: 5160/063

SUMMIT ISSUES STATEMENT ON NUCLEAR ACCIDENT

OW051003 Tokyo KYODO in English 0955 GMT 5 May 86

[Text] Tokyo, May 5, KYODO -- Following is the full text of a summit statement on nuclear accident:

1. We, the heads of state or government of seven major industrial nations and the representatives of the European Community, have discussed the implications of the accident at the Chernobyl nuclear power station. We express our deep sympathy for those affected. We remain ready to extend assistance, in particular medical and technical, as and when requested.

2. Nuclear power is and, properly managed, will continue to be an increasingly widely used source of energy. For each country the maintenance of safety and security is an international responsibility, and each country engaged in nuclear power generation bears full responsibility for the safety of the design, manufacture, operation and maintenance of its installations. Each of our countries meets exacting standards. Each country, furthermore, is responsible for prompt provision of detailed and complete information on nuclear emergencies and accidents, in particular those with potential transboundary consequences. Each of our countries accepts that responsibility, and we urge the government of the Soviet Union, which did not do so in the case of Chernobyl, to provide urgently such information, as our and other countries have requested.

3. We note with satisfaction the Soviet Union's willingness to undertake discussions this week with the director-general of the International Atomic Energy Agency (IAEA). We expect that these discussions will lead to the Soviet Union's participation in the desired post-accident analysis.

4. We welcome and encourage the work of the IAEA in seeking to improve international cooperation on the safety of nuclear installations, the handling of nuclear accidents and their consequences, and the provision of mutual emergency assistance. Moving forward from the relevant IAEA guidelines, we urge the early elaboration of an international convention committing the parties to report and exchange information in the event of nuclear emergencies or accidents. This should be done with the least possible delay.

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CSO: 5160/055

RADIOACTIVE JET STREAM LEAVES JAPAN, HEADS NORTH

OW050823 Tokyo KYODO in English 0814 GMT 5 May 86

[Text] Tokyo, May 5 KYODO -- The jet stream believed to have brought radioactivity leaked in the nuclear plant accident in the Soviet Ukraine has moved northward from Japan, the meteorological agency said Monday. If the radioactivity found in Japan's natural environment was brought by the jet stream, radioactivity levels should go down from now on. However, the radioactivity could also reach Japan via lower air currents, the agency said, adding they still have to keep watch.

The jet stream was blowing east over Hokkaido Saturday, after the Chernobyl nuclear plant meltdown last week. But it moved north of the Sea of Okhotsk Sunday morning. It is now passing over the Kamchatka peninsula to the Pacific Ocean, according to the Agency.

The jet stream was blowing in the Ukraine region towards Scandinavia at an altitude of 5,500 meters, according to reports as of 9 p.m. Sunday. It then spreads into two currents -- a weaker current going eastward and another southward to the Black Sea before again turning northward. The two currents meet again east of the Urals to blow eastward at around 60 degrees north latitude, the agency said.

Winds were blowing north-northwest at a speed of 22 meters per second above Kiev.

/9274
CSO: 5160/053

JSP CHAIRMAN ENDS 'ANTINUCLEAR' OCEANIA TRIP

OW221311 Tokyo KYODO in English 1304 GMT 22 Apr 86

[Text] Wellington, 22 Apr (KYODO)--Masashi Ishibashi, chairman of the Japan Socialist Party (JSP), completed his "antinuclear, arms control" trip to Oceania Tuesday, with a renewed determination to promote his party's nuclear-free policy.

Ishibashi's trip to Australia and New Zealand drew to a close at a time of a continuing diplomatic row between the United States and New Zealand over the refusal by the labor government or Prime Minister David Lange to allow port calls by U.S. ships carrying nuclear weapons. Lange's antinuclear policy has threatened the very existence of the Australia-New Zealand-United States (ANZUS Treaty) of 1951, according to the U.S., but the New Zealand premier repeatedly denied that in a meeting with Ishibashi.

The leader of Japan's No 1 opposition party clearly supported Lange's stance and said his party plans to sell the idea to nuclear weapons-allergic Japanese voters. On the other hand, he also found in the course of his trip to Australia that Australian leaders consider the security arrangements between Washington and Canberra vital to the security of their country regardless of political orientations.

In the end, sources said, Ishibashi's Oceanian trip has broadened his party's international stance but he continues to pursue the present "antinuclear, non-alliance" policy irrespective of dissenting voices within his own party.

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CSO: 5160/048

BRIEFS

PRC NUCLEAR SYMPOSIUM--Hiroshima, 22 Apr (KYODO)--A six-man Japanese group, including four atomic bomb victims of Hiroshima and Nagasaki will visit China for nine days starting Thursday to appeal for a nuclear-free Asia and Pacific. The group, headed by Yukio Yokohara, official of the Hiroshima chapter of the Japan Congress Against Atomic and Hydrogen Bombs (Gensuikin), will visit China at the invitation of a Chinese labor organization. The six are scheduled to attend a symposium entitled "labor unions and peace" in Beijing and visit three other cities. [Text] [Tokyo KYODO in English 0955 GMT 22 Apr 86 OW] /9738

CSO: 5160/047

PRC CANCELS AGREEMENT TO PURCHASE NUCLEAR REACTORS FROM FRG

Hamburg DER SPIEGEL in German 10 Mar 86 p 164

[Unsigned article: "Painful Blow"; first paragraph is a SPIEGEL observation]

[Text] Since the German reactor builders did not get a chance in China, it is completely unclear what is going to happen with regard to Beijing's nuclear plans.

The 48 red files in room 2657 of the Beijing "Minzu" Hotel only have documentary value since the past week: The billion-mark project of the FRG Kraftwerk Union (KWU), which is described there on thousands of pages in all technical details, has been canceled by China's economic planners because of a lack of capital and foreign exchange.

The thus far biggest German-Chinese nuclear project involved the turnkey construction of two nuclear power plants with 1000 megawatts each. The Chinese rejection is "a painful blow," according to Werner Henschel, KWU's Beijing representative. The Siemens subsidiary had already invested DM 10 million in the project.

Last summer, foreign ministers Wu Xueqian and Hans-Dietrich Genscher, watched by the satisfied smiles of Federal Chancellor Helmut Kohl and Premier Zhao Ziyang, had agreed in Bonn that the Germans were to deliver "Agreement on Cooperation in the Field of the Peaceful Use of Nuclear Energy." "Nuclear energy is a safe, clean, and progressive energy source," Vice President Li Peng raved at that time.

Three to four large and medium-sized nuclear power plants were to be built by 1990; by the turn of the century Beijing wanted to have ten nuclear power plants with a total capacity of 10,000 megawatts. By the year 2000, the estimates went, nuclear power would constitute about 4 percent of the total Chinese consumption of electricity.

Following the latest decision, not much will be left of the ambitious plans. For the time being, only two nuclear power plants are to be built.

The Qinshan nuclear reactor in Zhejiang Province is to go on stream with 300 megawatts in 1986. The power plant will supply especially Shanghai, the city of 10 million situated 126 km to the north. The Qinshan reactor, constructed according to the obsolete technology of Westinghouse, the U.S. power plant builder, is praised as the first domestic development. Also being continued is the construction of the Daya Bay nuclear power plant in the southern province of Guangdong, which, with a capacity of 1800 megawatts, will sell the power for good foreign exchange to nearby Hong Kong.

Here, too, KWU had submitted its bid--without success. The Chinese negbtiated with the British and the French; the contract is not yet set. Early March, the rumor goes, the final award is to go to General Electric and Framatome.

The German power plant builders had negotiated with all the more determination in connection with the project that has now been stopped. At the end of 1985 delegations numbering up to 40 persons had discussed all details for the construction of the first two pressurized-water reactors with the Chinese in Beijing and in Wuxi near the planned location. As recently as early March, KWU chairman of the Board Hans Frewer negotiated in Beijing. "The technology was 100 percent clear," KWU representative Henschel said, "we had hopes."

There wasn't enough money, but that also did not appear to be an obstacle. The partners had built a golden bridge for the foreign-exchange-short Chinese from concessions and offers of barter transactions. The bundle, put together in such a complex way, provided that half of the 6 billion DM installation would be settled with delivery of metals. Moreover, the Germans wanted to purchase grain, petroleum and bituminous coal as well as 6,000 tons of natural uranium from the Chinese. Plans also called for the politically controversial final storage of 150 tons of spent fuel elements in China.

The fact that this deal did not materialize is connected with the worry of the Chinese about too many debts and political dependence. Beijing wants to consolidate the reform policy of "opening to the outside and revival within," which led to illegal imports of luxury goods, to economic criminality, corruption, and overheated market conditions, by a conservative budget policy.

Thus KWU chairman Frewer returned from Beijing merely with a noncommittal declaration of intention: Both sides want to continue the cooperation in the field of nuclear energy.

The Chinese did not even want to say whether or not the other planned nuclear reactors would be built at all. The question was still being considered, they said.

All interested parties for possible new large-scale nuclear projects are being put off to the next 5-year plan: They could perhaps get an opportunity then. But the plan does not start until the year 1991.

12356/12781
CSO: 3620/625

CANADA

U.S. ASKED TO CONSIDER NUCLEAR SITES AWAY FROM BORDER

Toronto THE GLOBE AND MAIL in English 5 Apr 86 p A3

[Article by Jennifer Lewington

[Text] With a nervous eye on proposed U.S. nuclear waste dumps near the border, Canadian federal and provincial officials have urged the United States to consider other locations.

At a meeting yesterday, Canada also asked the United States to bring in the International Joint Commission, a bilateral agency for transboundary water issues, to referee some aspects of the nuclear-dump controversy.

The meeting was the first bilateral session since January, when the U.S. Department of Energy named 20 potential sites for underground disposal of highly radioactive waste. The list will be narrowed to one in the eastern United States by 2000.

Of the 20 sites, Canada is especially concerned about eight located in drainage basins that ultimately feed into Canada. These are in four border states: Minnesota, Wisconsin, New Hampshire and Maine.

"We suggested it seemed of doubtful merit to locate a nuclear waste repository in any areas of ground or surface water migration," said Stan Gooch, an External Affairs Department official who attended the meeting.

That description fits as many as five sites in the Red River basin, two in the Great Lakes basin and one in the St. Croix River area.

He said Canada suggested that the United States look at underground dry salt caverns as an alternative to sites subject to flooding, such as those near the Red River.

"We are opposed to any development which would pose a transboundary threat to Canadian health and property," Mr. Gooch said after the meeting. "The onus is on them (the United States) to establish there would be no transboundary effect."

By involving the IJC, Canada hopes to play a more direct role in the U.S. deliberations on a dump site.

At present, the United States listens to Canadian concerns at irregular bilateral consultations. But with the IJC, there is a bilateral vehicle for adjudicating transboundary water problems.

Mr. Gooch said both governments could use the IJC to examine and report on any transboundary implications of the proposed sites. Under the 1909 Canada-U.S. Boundary Waters Treaty, both countries agreed not to pollute waters flowing across the border or damage each other's health or property.

Canadian and U.S. officials agreed on a joint press line, which means Washington will consider the Canadian request about the IJC.

Manitoba, Ontario and New Brunswick, which all border on states with proposed sites, participated in part of yesterday's meeting.

/13104
CSO: 5120/35

CANADA

CHERNOBYL INCIDENT PROVOKES ACTION IN ONTARIO

Peace, Environmental Groups

Toronto THE GLOBE AND MAIL in English 7 May 86 p A17

[Article by Susan Delacourt]

[Text] Canada cannot afford to be smug in the wake of last week's Soviet nuclear accident, two nuclear researchers and the energy critic for Ontario's New Democratic Party said yesterday.

In a statement endorsed by 25 Ontario peace and environment groups, the three noted that the odds against a meltdown in a Canadian-made reactor are exactly the same as those offered by the Soviets three months before the disaster at the Chernobyl nuclear reactor complex.

Further, they said, Canada is not much better than the Soviet Union in providing details about the inner workings or potential hazards of its nuclear operations.

Accompanying the statement was a call for improved communication about the nuclear industry and public discussion about the threat of a Chernobyl-type accident in Canada.

Brian Charlton, the Ontario NDP energy critic, urged a provincial referendum on the future of nuclear power and an immediate hold on plans for the Darlington nuclear generating station.

Mr. Charlton and the two researchers at yesterday's news conference said Canadians can no longer be left out of decision making on nuclear operations. Nor can governments continue to provide only sketchy details on the potential dangers, they said.

"It just isn't good enough to state glibly — like the nuclear industry representatives have — that our reactors are different and it just couldn't happen here," said David Martin, a researcher with the Toronto Nuclear Awareness group.

"Any reactor system can melt down."

Dr. Rosalie Bertell, director of the International Institute of Concern for Public Health and a former consultant to the U.S. Nuclear Regulatory Commission, said she is wary of Ontario Hydro's commitment to protecting people from radioactive threats.

"One of the underlying problems is the difference between the definition of safety by engineers and the definition of safety by the general public."

The public may be told that radiation levels are safe, she said, but that definition is provided by engineers, who regard "legally permissible" and "safe" as synonymous.

In 1978, the Ontario Royal Commission on Electric Power Planning stated that for each reactor in Ontario, there is a one-in-10,000 chance of a meltdown each year.

Coincidentally, Mr. Martin noted, the same odds were touted three months ago by the Ukrainian minister of power and electricity as proof of Chernobyl's invulnerability.

Yesterday's statement advocated the phasing out of all nuclear operations and renewed examination of alternate energy sources.

"The whole world lives downwind from Chernobyl," it said.

Review of Nuclear Installations

Toronto THE GLOBE AND MAIL in English 7 May 86 p B9

[Article by Dennis Slocum]

[Text] The Ontario Government is reviewing the province's nuclear power installations in the wake of the recent disaster at the Chernobyl nuclear power plant in the Soviet Union.

Provincial Energy Minister Vincent Kerrio told the Canadian National Energy Forum in Toronto that he has asked for a study on all phases of the nuclear program, including safety and emergency planning.

Nuclear plants currently provide about one-third of the province's power, with the remainder split evenly between hydroelectricity and coal.

Mr. Kerrio said nuclear power's role could possibly decline. "It depends on the future. Guaranteed supply is a must."

Ontario's industry tends to be capital and energy intensive and more energy capacity will be needed.

The plan is to stress energy efficiency and work on developing increased sources of power supply, the meeting was told. The Government wants "to take advantage of" generating stations that can use more than one fuel, local hydro sources and energy from waste.

An expected fundamental shift before the end of the century to information and other service-oriented industries will help restrain energy consumption, Mr. Kerrio said. Also, the Government will encourage investment in energy-efficient plants and equipment.

A priority is removing barriers to energy efficiency, "whatever form those barriers take," he said.

Mr. Kerrio charged that federal regulators are dragging their feet on natural gas and that prices may never drop as much as they should when the industry is deregulated in November.

"We believe the system is still far too rigid and that pipeline and distribution companies are less than enthusiastic about the new environment," the meeting was told.

After noting that an inflexible system removes true competition, Mr. Kerrio said Ontario wants companies to have "non-discriminatory" access to the pipeline system of Transcanada Pipelines Ltd. of Calgary.

"We have shown our willingness to co-operate with the federal Government and the producing provinces. . . . In return, we expect that Ontario will be a full participant in any future policy discussions."

The Chernobyl system would not be allowed in Canada, Tom Campbell, chairman of Ontario Hydro, told the forum. However, he admitted that the disaster "will shake a lot of people's confidence in the system."

Ontario's plants are safe, he said, noting the massive amounts of cement used as protection. "The Darlington plant used enough cement to build 12 CN Towers," he said. "It adds incredibly to cost, but it is a safety factor."

Nuclear plants, while more expensive to build than coal-fired generators, are less expensive over the life of the plant because fuel costs are lower, he said.

Options available for the future also include long-term purchases of power from Manitoba or Quebec, he added.

/13104
CSO: 5120/36

CANADA

ELDORADO NUCLEAR REPORTS DEBT, SEEKS DUMPSITE

1985 Loss

Ottawa THE CITIZEN in English 22 Apr 86 p B4

[Text] A debt-laden Eldorado Nuclear, the government's uranium mining and processing company, slipped into the red last year, losing about $57 million, says the company's annual report released Monday.

Eldorado is one of the government's Crown corporations that is up for sale.

Management blamed the $57.2-million loss on its debt load, royalty payments and low uranium prices. The balance sheet showed a profit of $4.4 million in 1984.

The loss, the second in 12 years, came even though revenue increased six per cent to $219.8 million.

Eldorado has a long-term debt of $513.5 million, an amount built up by an expansion program that has nearly trebled its assets since 1980. Interest expenses of $73 million last year ate up one-third of its revenue.

The report noted that Eldorado is one of the most highly leveraged mining companies in Canada, with almost three times as much debt on its balance sheet as shareholder equity.

About $80 million of its long-term debt is due this year, but the company has decided to borrow the money to make the loan payment, finance vice-president Tom Gorman said.

The company had hoped when it decided to finance its expansion plans that the uranium market would be stronger than it is.

In hindsight, it would have been better to borrow the funds over a longer term, Gorman said.

Eldorado was forced to take on debt because the government refused to contribute any further equity.

The report said that both the company and the government recognized that weak markets could result in losses until the new operations start to provide enough cash to cover financing expenses.

Uranium production was off 24 per cent, primarily because of lower production from its Rabbit Lake mine in northern Saskatchewan.

While uranium markets have been weak in recent years, the report said things are looking up as more nuclear reactors come on stream.

The company's order book was 50 per cent thicker at the end of 1985 than it had been the previous year.

Search for Permanent Dumpsite

Ottawa THE WEEKEND CITIZEN in English 26 Apr 86 p A3

[Text] **PORT HOPE (CP) — Eldorado Resources Ltd. is seeking a permanent dumpsite for the nearly one million tonnes of nuclear waste deposited in and around this community, the federal government said Friday.**

Bob Layton, minister of state for mines, said the site will hold the low-level radioactive waste produced at the Crown corporation's uranium refinery in Port Hope.

Should the federal government succeed in its attempt to sell Eldorado, he said, the government would remain responsible for cleanup.

He said any site selected would have to be approved by an environmental assessment review panel, plus the federal and Ontario governments.

About 200,000 tonnes of waste is deposited in six ravines in Port Hope's. Another 600,000 tonnes is in a dump site near Newcastle, about 20 kilometres away, and about 200,000 tonnes in a dumpsite in nearby Hope township.

/13104
CSO: 5120/36

CANADA

TV SCAN FINDS SPLIT IN BRUCE REACTOR PRESSURE TUBE

Toronto THE GLOBE AND MAIL in English 12 Apr 86 p A3

[Article by Thomas Claridge]

[Text] A television scan inside a reactor pressure tube, which failed suddenly at Ontario Hydro's Bruce Nuclear Power Development last month, has disclosed a split at least three metres long, a Hydro spokesman said yesterday.

Michael Williams said the scan by a $50,000 miniature TV camera system also showed that at least one of 6½ "pencils" missing from uranium fuel bundles removed from the tube is lodged in the huge fissure.

The probe on Thursday confirmed that the crack was along the top of the tube, and that the rupture on March 28 may have started in an area where three other pressure tubes in the same Unit 2 reactor sprang small leaks in 1982 and 1983, he said.

Two weeks after the rupture, officials are still uncertain as to either its cause or long-term significance. But the most popular theory is that the incident is more like the earlier small leaks than the only previous pressure-tube rupture at Pickering in 1983.

The Pickering rupture was on the bottom, rather than the top, of the tube and was ultimately attributed to the tendency of metal used in the pressure tube to absorb high levels of hydrogen at points where it had come in contact with an outer "calandria tube."

Mr. Williams said tests carried out on the Unit 2 reactor last year included detailed examination of 20 pressure tubes and removal of one known to have been in contact with its calandria tube for several years. He said examination of the tube at the Chalk River Nuclear Laboratories confirmed that hydrogen levels in the tube walls were low.

The three previous leaks within the Unit 2 reactor all developed at points where the tubes had been roll-pressed into the reactor's end fittings.

/13104
CSO: 5120/35

BRIEFS

U.S. SUBMARINE VISIT PROTEST--A local peace group is upset by the presence of an American submarine in port, saying the boat is carrying nuclear warheads. The USS Von Steuben docked Tuesday at Canadian Forces Base Shearwater with a crew of 168, triggering protests from the disarmament group Project Ploughshares. Group spokesman Valerie Osborne said the 123-metre vessel carries 16 multiple-warhead nuclear missiles and is in violation of federal government policy not to allow nuclear weapons on Canadian soil. [Text] [Ottawa THE CITIZEN in English 23 Apr 86 p E8] /13104

SASKATCHEWAN 1984 URANIUM PROFITS--The Saskatchewan Mining Development Corp. reported an $18-million profit in 1985, up 18 per cent from 1984 due to increased world demand for uranium. The annual report of the provincial Crown corporation, tabled in the legislature Wednesday, showed the mining development company made an extra $3 million last year. [Text] [Ottawa THE CITIZEN in English 18 Apr 86 p A22] /13104

CSO: 5120/35

IMPROVEMENT OF NUCLEAR REACTOR EFFICIENCY URGED

Sofia RABOTNICHESKO DELO in Bulgarian 18 Apr 86 p 3

[Article by Ivan Pandev, chairman of Council of Ministers' Committee for Use of Atomic Energy for Peaceful Purposes: "Atomic Energy a Powerful Means of Development"]

[Text] One of the principal features of the second half of our century is the rapid development of nuclear science and technology and their wide-scale penetration of industry, agriculture and medicine. In our country the first 440-MW (e) reactor was put into operation in 1974. At the moment four blocks with a total installed power of 1760 MW (e) are in operation.

In 1985 when our power industry was experiencing certain difficulties and production tempo and domestic power supply were disrupted, the Kozloduy Atomic Power Plant was operating trouble-free at full capacity and producing more than 30 percent of the electric power the country obtained. The Bulgarian People's Republic ranks as one of the first in the world in respect of this criterion. We can easily imagine what a severe crisis our country would have suffered if it had not been bearing towards wide-scale use of this new type of power production technology.

What has been achieved in this area is, of course, not the limit. Not for nothing does the Report of the BCP Central Committee to the 13th Congress emphasize that "the importance of the atomic power industry is continuously growing. . ." In fulfillment of the approved program two reactors, each with a capacity of 1000 MW (e), are to come into operation at the Kozloduy Atomic Power Plant, while the construction of six reactors, each of 1000 MW (e), is being accelerated at the new site near Belene. By the year 2000 our country will have a nuclear capacity of 9760 MW (e), which will produce 65-70 percent of the entire generated electric power. The equivalent of this electric power is 15 million tons of petroleum or 90-100 million tons of our lignite a year.

At the price of what, it is worth reflecting, would we procure this quantity of petroleum? And from where would we obtain these additional quantities of lignite? But even if we had it in the ground, how many new railroad lines and other facilities would have to be constructed and how much rolling stock would have to be used to transport it? And how would the combustion thereof affect the environment? As in due course our country moves towards the use of atomic energy for the production of electricity and, in the future, will also use atomic plants to supply heat and steam, it is solving problems of a global character not only in the area of power engineering, but also in the area of the ecology.

Forecasts of our country's power provision up to the first few decades after the year 2000 show that there is no alternative to a nuclear power supply. The other socialist countries, including the USSR (in the European part of that country), are also in a similar position. This makes it imperative for the CEMA-member countries to concentrate their energies and resources on reconstructing the power industry, increasing its efficiency, curtailing substantially the use of scarce organic fuel, and improving the heat supply of cities and environmental protection.

That is why the Comprehensive Program for the Scientific and Technical Progress of CEMA-Member Countries up to the Year 2000, adopted at CEMA's 41st extraordinary session, envisages the application of a number of new technologies and developments, which have as their aim to improve the nuclear capacities in operation and the new ones under construction.

To achieve these goals, we must, with the joint efforts of the fraternal countries and, above all, the USSR, improve the quality of the VVER [water-moderated water-cooled reactor]-440 and the VVER-1000 and increase their technical and economic efficiency. Highly reliable new systems, using computers [of Western (kompyuteri) and CEMA (elektronno-izchislitelna mashina) make] for the automation of technological processes, must be introduced. In this way monitoring-and-measuring processes and control and safety systems will be improved.

A rapid development of robotics has recently been registered. The atomic industry has an interest in the possibilities of using robots under elevated-radiation conditions where it is difficult, and in many cases forbidden, for humans to work. Special robots and manipulators are being created to perform monitoring, repair and destructor operations.

The use of natural uranium must be improved. The contribution of uranium to the world fuel-energy balance can be increased 50- to 70-fold by "burning" uranium-plutonium fuel in fast-neutron reactors. A great problem in nuclear power engineering is the efficient processing, conveyance and storage of radioactive wastes.

The technological level of our industry makes it possible to step up its participation in the building and operation of atomic power plants. With the strenuous program for the construction of nuclear capacities in the period up to the year 2000 and thereafter, clearly the state must allot considerable funds for the import of equipment. Without a decisive increase of the participation of our machine-building and electronic industries in the production thereof for our needs and for shipments under subcontracting arrangements within the CEMA framework, the balancing of these resources is difficult to accomplish and in practice may delay the targeted rate of construction of our country's nuclear power industry with all adverse consequences for meeting the country's energy balance.

There is no doubt that these possibilities and problems engage the attention of the party, state, economic and public organizations concerned and that they will have an important place in their activity to implement the decisions of the 13th Party Congress.

6474
CSO: 5100/3039

PROGRESS REPORT ON INSTALLATION OF EQUIPMENT AT 1000-MW UNIT

Sofia TRUD in Bulgarian 14 Apr 86 p 1

[Article by Valeri Vedov, TRUD correspondent: "Installers Have the Floor--Construction Men Have Wound up Work on Fifth Power Block of Kozloduy SAEK [not further identified; possibly Stopanski Atomno-Energien Kombinat, 'Economic Atomic Energy Combine']--Checking and Pre-Startup Operations Beginning on Principal Subprojects--Newspaper TRUD Watching Construction of Projects of Especially Great Significance for Power Industry"]

[Text] "This is our Everest!" exclaimed Engr Todor Topalski, director of the Industrial Construction Enterprise, when after traversing hundreds of steps we finally set foot on the dome of the reactor compartment. It was not so much the height that lured him into this comparison, but rather the enormous labor, will and energy invested here by the construction men and installers of the Fifth Power Block of Kozloduy SAEK.

The concreted dome is beyond a doubt the best observation site, from which the great building can be encompassed in a glance. Under way here are the final construction jobs on the reactor compartment--the so-called stressing of the dome, which will ensure its stability.

This operation is carried out with long sheaves of steel wire, and the specialists preferred the product of the Steel Wire and Cable Economic Enterprise in Roman to imports due to their better quality criteria. This indicates good rehabilitation of the Roman workforce, which until recently was often reproached for its low-quality output.

Installers and power engineers already have the floor in the reactor compartment and its more than 800 rooms. In the central room where at the end of the year the 1000-MW reactor will produce the first electric power for the country, the Yuriy Gagarin brigade of two-time Hero of Socialist Labor Gospodin Yordanov is working. In honor of the 13th BCP Congress they have completed ahead of schedule the final assembly of the inner-vessel layout of the reactor, sealing the basic pit. True, in the weeks ahead they face extremely complex and critical operations, but the members of the Gagarin brigade are gratified that they have wound up one very important stage of their job. With the 1000-MW unit, as compared with the previous power blocks, many things are new and even these expert and highly qualified installers have something to learn. . .

Nor can we pass over the "brain" of the Fifth Power Block--the command room, which with surprising rapidity becomes a flank observer. Most of the complex instrumentation through which humans will control still more complex processes for the production of atomic energy is already in place. Employed in this room are the representatives of Energomontazh [Economic Enterprise for Electric Wiring Installations] at Kozloduy and the operations specialists--the future masters who from here will observe and monitor the pulse of the 1000-MW unit.

These days great attention is paid to one of the principal subprojects of the power block--the machine room. The bulk of the work here was taken on by Energomontazh of Varna. The workers and specialists from this enterprise achieved their pledged result in many days of strenuous work. A test spin has been made of the turbogenerator, which, according to the director of the Varna installers, Ivan Lichkov, means that the specialists can already prepare the steam generator for full revolution through the use of steam from external sources.

The installers have had to overcome many difficulties, but now they are satisfied that the work has fallen into its normal rhythm. The turbine rotor was delivered late for a number of reasons, and in just 1 month Ivan Zhabov's brigade succeeded in installing and centering it. In the unanimous opinion of the specialists, never before had such a rotor been installed in so little time. Also satisfied with what had been accomplished was Hero of Socialist Labor Nikola Naydenov, whom we found (together with Iliya Uzunov) making final checks of the rotor's axial bearing. Fulfilling what they had pledged despite objective difficulties, they believe, is a matter of honor of an installer. And these words on the lips of Nikola Naydenov do not have the ring of gushiness, but the conviction of a master workman who has behind him all the plants of the Devnya Lowland and so many electric power plants in the country that he himself is hard put to it to count them up.

Concentrated in the machine room now are 26 installation brigades from Varna, Kozloduy and Pleven. They have installed nearly 2000 tons of tubing, the wondrous tangle of which leaves one amazed. Only somebody through whose hands thousands of meters of tubing has passed can explain and unriddle their route. In addition to insulation of the feed pipes, tests of the main steam pipes have also started. The brigades of Prokopiy Yonchev and Angel Donov are performing one of the most crucial installation jobs--the so-called filling of the system with oil. This activity requires very clean work and high quality. Assessing the work so far of the Varna installers, Director Ivan Lichkov is sure that they will meet these high criteria. The period of pre-startup tests in the machine room will come to an end in the month of May. Or, in the expression of one installer, in spite of the strain the work is already going easier [word illegible] the end is in sight.

6474
CSO: 5100/3039

GERMAN DEMOCRATIC REPUBLIC

NEW LEGAL DIRECTIVE ISSUED GOVERNING NUCLEAR WASTE STORAGE

East Berlin GESETZBLATT in German Part I No 13, 15 Apr 86 pp 182-3

[Directive by Chief Public Health Officer Prof Dr med. habil., Dr rer. nat. h. c. Sitzlack, state secretary and president of the GDR State Office for Nuclear Safety and Radiation Protection, issued in Berlin on 25 February 1986]

[Text]

Directive on the Central Collection and Terminal Storage of Radioactive Wastes

of 25 February 1986

In order to implement Article 17 of the ordinance of 11 October 1984 on ensuring nuclear safety and radiation protection (GESETZBLATT Part I, No 30, p 341), the following is decreed for the safe and economically efficient collection and terminal storage of radioactive wastes, in concord with the heads of the appropriate central state organs and in agreement with the national executive committee of the Free German Labor Union Federation:

Article 1

Purview

(1) This directive regulates the central collection and terminal storage of radioactive wastes. (Footnote 1) (Radioactive waste: Radioactive material whose further use is not possible for scientific, technical, and economic reasons and which is disposed of under conditions that isolate it from the environment; furthermore, the activity and activity concentration of such waste exceed the stipulated release limits for radioactive waste.) The classification of radioactive wastes into types of waste and radiological groups is regulated according to the directive of 4 September 1981 on the General Performance Terms for the Central Collection and Terminal Storage of Radioactive Wastes (Special Edition No 1073 of the GESETZBLATT).

(2) This directive is in force for

- State organs,
- Combines, industrial-management organs, enterprises, cooperatives, institutions, and corporative organizations (termed enterprises in what follows),

that use nuclear energy.

(3) For radioactive wastes that contain nuclear material, in addition the legal regulations are in force concerning the control of nuclear material and the physical protection of nuclear material and nuclear facilities.

(4) This directive does not apply to the release of radioactive discharges into the environment, inclusive of the storage of materials and waste substances containing natural radionuclides in dump heaps and settling facilities.

(5) This directive does not apply to other wastes that are generated in the use of nuclear energy but whose activity or activity concentration is below the release limits for radioactive wastes. For such wastes, the legal regulations of the environmental control law on the safe disposal of non-usable waste products are in effect.

Article 2

Basic Principles

(1) Radioactive wastes must be collected and put in terminal storage in a central location whenever a falling below the release limits is not achieved by intermediate storage after a period of 1 year, or when other stipulations are made in the authorization permit.

(2) For radioactive wastes, the release limits are applicable as stipulated in Article 28, Paragraphs 1 and 5 of the implementing regulation of 11 October 1984 on the ordinance concerning the ensuring of nuclear safety and radiation protection (GESETZBLATT, Part I, No 30, p 348). The provision in force for the use of the release limit on activity is that for each application case, wastes with an activity per week up to the release limit can be disposed of without authorization. In lieu of the release limit on activity concentration of 100 Bq/gram, it is permissible to use

- for solid wastes with radionuclides that emit photons having an energy > 20 keV, an equivalent dose rate of 10 µSv/hour, measured at a distance of 0.1 meter from the unshielded surface;

- for solid wastes with contaminated surfaces, a surface contamination figure for alpha-emitters of 50 kBq/m^2, and for beta/gamma emitters a figure of 500 kBq/m^2.

If these criteria apply concurrently, then the more restrictive value is in effect.

(3) The object of the central collection is the delivery of radioactive wastes by the enterprises in which the wastes are generated, in conjunction with the acceptance of these wastes by the enterprise that is entrusted with the central collection and terminal storage. (Footnote 2) ("Bruno Leuschner" Nuclear Power Plants Combine VE of Greifswald, operational section of terminal storage for radioactive wastes, 3241 Morsleben)

(4) The object of the central terminal storage is the transporting of the radioactive wastes to a site for their permanent retention, under conditions that are suited to an isolating of the radionuclides from the environment until their activity falls below the stipulated release limits.

(5) In the planning, preparation, and execution of capital projects and processes for the use of nuclear energy, the requisite measures for the disposal of radioactive wastes, consisting of their gathering, treatment, intermediate storage, and delivery to the central collection, must be taken into account by the enterprises.

(6) Radioactive materials may be delivered to the central collection and terminal storage as radioactive wastes only if, after a consideration of the economic cost involved, these materials as a whole or components of them cannot be put to any further in-house and inter-enterprise use or second-time use as secondary raw materials in accordance with the legal regulations applicable to this.

(7) The accumulation of radioactive wastes must be kept as small as possible. Radioactive wastes that are subject to central collection and terminal storage are to be gathered together separately from other wastes, are to be converted into a form acceptable for central collection, and are to be put into intermediate storage within the radiation-protection area until delivery to the central collection enterprise. In connection with this intermediate storage, the retrievability of the radioactive wastes must be ensured.

(8) A diluting of radioactive wastes for the purpose of reducing their activity below the release limits for radioactive wastes is not permitted.

(9) With respect to the gathering, treatment, intermediate storage, and central collection and terminal storage of radioactive wastes, control and security measures must be implemented so as to prevent unauthorized access.

Article 3

Responsibility

(1) Those enterprises in which radioactive wastes are generated are responsible for the gathering, treatment, intermediate storage, and delivery of radioactive wastes to the central collection site.

(2) Organs of the state within whose sectors nuclear energy is used directly bear the same responsibility as enterprises in accordance with Paragraph 1.

(3) The enterprise that carries out the terminal storage of radioactive wastes is responsible for the acceptance of radioactive wastes for such terminal storage.

Article 4

Operational Control and Documentation

(1) The enterprises in which radioactive wastes are generated must ensure operational control over the accumulation and retention of radioactive wastes. To that end, a balance sheet is to be drawn up concerning the quantity (with solid and liquid wastes--volume; with sealed radiation sources--number of pieces) and the activity of radioactive wastes that have been generated in the report period, conveyed to central collection and terminal storage, disposed of through other methods, and put into intermediate storage at the enterprise. For the wastes conveyed to the central collection and terminal storage site, in addition to the overall activity also the activity of the separate radionuclides must be given. Other stipulations may be made in the authorization permit.

(2) The enterprise that carries out the central collection and terminal storage of radioactive wastes must ensure operational control over the accepted and terminally stored wastes. It must provide the documentation concerning the amount, overall activity, activity of the separate radionuclides, and origin of the radioactive wastes that have been collected and put in final storage.

Article 5

Authorization

(1) The disposal of radioactive wastes is regulated in the authorization procedure for the relevant use of nuclear energy. With the application for authorization, it must be demonstrated that all radioactive wastes generated can be disposed of in accordance with the legal regulations.

(2) With the application for a permit, the following information and certifications on radioactive wastes must be presented:

1. for the approval of the site and the goals established

   the basic plan for waste disposal, with

   a) preliminary data on the accumulation of radioactive wastes,

   b) a proposal for the central collection and terminal storage of the radioactive wastes generated;

2. for the approval of the construction and the project

the documentation on waste disposal with

a) information on the organization of the enterprise's waste management,

b) description of the properties of the radioactive wastes (types of waste, radiological groups, physical condition and chemical composition) and information on the waste accumulation (amount, overall activity, activity of the separate radionuclides),

c) description of the arrangements, equipment, and procedures for gathering, treatment, and intermediate storage, including retrievability, and of the delivery of radioactive wastes to the central collection site,

d) information on the operational control and security measures and on the documentation concerning the radioactive wastes,

e) information on the secondary raw materials that are contained in the radioactive materials destined for waste disposal, and on results of studies concerning their in-house or inter-enterprise second-time use,

f) declaration by the enterprise responsible for the central collection and terminal storage that the radioactive wastes destined for central collection can be collected and put in terminal storage in accordance with the legal regulations,

g) delineation of the tasks that still must be resolved before starting the delivery of radioactive wastes;

3. for the approval of initial startup

the proof of contractual arrangements with the enterprise responsible for the central collection and terminal storage;

4. for the approval of decommissioning

information on the removal of radioactive wastes.

(3) Before changes are made that have an effect on the accumulation and properties of radioactive wastes, a modification of the permit must be applied for by the enterprises.

(4) Concerning the types of authorization of recording and registration, the stipulations in the design qualification approval are in effect for the disposal of radioactive wastes.

Article 6

Performance Terms

(1) Radioactive wastes must be registered at the central collection site with the enterprise responsible for this collection. The requirements in terms of the form and properties of the radioactive wastes as well as the delivery and acceptance conditions are governed by the Directive on the General Performance Terms for the Central Collection and Terminal Storage of Radioactive Wastes of 4 September 1981.

(2) The central collection and terminal storage of radioactive wastes operates on a cost-payment basis. The costs are to be borne by the enter[illegible]ich these wastes are generated.

Article 7

Exemption Arrangements

(1) If there are compelling reasons, in exceptional cases departures from the stipulations of Article 2 and Articles 4 to 6 of this directive can be permitted by way of fixed-period exemption arrangements.

(2) Exemption arrangements in accordance with Paragraph 1 are made by the president of the State Office for Nuclear Safety and Radiation Protection upon application by the heads of the enterprises.

(3) Whenever these exemption arrangements affect the fields of duties of other central state organs, such arrangements are to be made in concert with the heads of these appropriate central state organs.

(4) The application for exemption arrangements must be in written form and must contain:

a) The justification for the departure from the stipulations of this directive;

b) The scope and the period of effectiveness of the exemption arrangements;

c) Measures that ensure the central collection and terminal storage of radioactive wastes under the divergent conditions, and

d) Measures for establishing the state of affairs called for in this directive and the target dates for realizing this.

(5) Exemption arrangements must be in written form and can be revoked at any time.

Article 8

Final Provisions

(1) This directive goes into force on 1 July 1986.

(2) At the same time, the directive of 11 May 1981 on the central collection and terminal storage of radioactive wastes (GESETZBLATT, Part I, No 16, p 224) becomes invalid.

Berlin, 25 February 1986

The President

of the State Office for Nuclear Safety and Radiation Protection

of the German Democratic Republic

Chief Public Health Officer Prof Dr med. habil., Dr rer. nat. h. c.

Sitzlack, state secretary

12114
CSO: 5100/3037

GERMAN DEMOCRATIC REPUBLIC

BRIEFS

NUCLEAR COOPERATION PROTOCOL SIGNED--Copenhagen, 1 May (ADN)--At the invitation of the Danish minister of the environment, Christian Christensen, a GDR delegation led by Secretary of State Professor Sitzlack, president of the State Office for Nuclear Safety and Radiation Protection, continued talks this week in Copenhagen on questions concerning the effectiveness of nuclear environmental protection and thus protecting the population in the peaceful application of nuclear energy. The two sides noted that cooperation on the basis of an agreement reached in 1980 has proven useful and agreed that they would continue this cooperation. Proposals to this end were discussed and a joint protocol was signed. [Text] [East Berlin ADN International Service in German 1423 GMT 1 May 86 LD] /9274

CSO: 5100/3038

ARGENTINA

CONSTANTINI ANNOUNCES REACTIVATION OF NUCLEAR PROJECTS

PY140137 Buenos Aires TELAM in Spanish 1357 GMT 13 May 86

[Text] Cordoba, 13 May (TELAM)--National Commission for Atomic Energy (CNEA) President Alberto Constantini has said that the 1986 budget will permit the reactivation of all CNEA projects, adding that in late 1987 or early 1988 the heavy water plant in Arroyito, Neuquen Province, will be completed.

While speaking to the press, Constantini, who had attended the Cordoba lectures devoted to atomic energy, expressed his confidence that the work on the third nuclear power plant, Atucha II, will progress steadily during 1986 and 1987.

Constantini stated that the 1986 CNEA budget is in the order of $720 million, and that in 1987 the budget could total $900 million in order to continue the Atucha II project. He recalled that the contracts on the two most important projects (Atucha and the heavy water plant), which were virtually paralyzed, have been renegotiated and a new timetable drawn up.

Constantini also ruled out delays in the Radioisotopes Center project which will be erected in Embalse, Cordoba Province, stating that we are implementing the basic engineering work and the planning state has been completed.

Concerning security at the nuclear plants, Constantini emphasized that we have arrived at the conclusion that the Chernobyl (Soviet Union) accident could never have happened here because, among other reasons, we have three safety barriers which they (the Russians) lack, namely the pressure vessel, which contains the fuel, a 4-cm thick steel cladding, and finally a prestressed concrete container. The Russian cost projection for a power plant is $200 per KWH and we have built a power plant at a cost of $2,500 per KWH.

/9604
CSO: 5100/2070

ARGENTINA

BRIEFS

FAULTY VALVE AT NUCLEAR PLANT--Cordoba, (NA-DYN)--There was an ammoniac gas leak in the local National Atomic Energy Commission (CNEA) plant when a fault developed in a safety valve, thus raising the spectre of a Chernobyl-style disaster. However CNEA said there was no danger. [Text] [Buenos Aires BUENOS AIRES HERALD in English 19 May 86 p 5 PY] /7358

CONSTANTINI DENIES SHARE TRANSFER--Buenos Aires, 28 Apr (NA)--Alberto Constantini, chairman of the National Atomic Energy Commission [CNEA], today denied that the government is considering transferring some of the shares it has at the Argentine Nuclear Enterprise for Electrical Power Plants [ENACE] to the FRG Kraftwerk Union [KWU]. In remarks to NA, Constantini stated: "I have never read anything as fantastic as this report since the books by Jules Verne," referring to a communique released by the Metropolitan Justicialist Party. In this manner, Constantini denied a report released by the Energy Commission of the Metropolitan Justicialist Party, which states that if this transfer to the KWU is firmed up, "it will be formally responsible for the handling of the installation of the Atucha II nuclear plant and of future plants." Constantini stated that "that report is absolutely false" and added that "the nuclear program will not be nationalized." He explained that the CNEA "is using part of an original credit of 16 billion marks, equivalent to about $60 million, for the conclusion of Atucha II, which is scheduled for 1989." In conclusion, Constantini lamented that "the experts of the Justicialist Metropolitan party are so ill-informed." He added: "My office is open to report to any citizen on any activities of the CNEA." [Text] [Buenos Aires NOTICIAS ARGENTINAS in Spanish 1950 GMT 28 Apr 86 PY] /6091

CSO: 5100/2065

BRAZIL

SARNEY SCORES SUPERPOWERS' ARMS RACE AT DISARMAMENT CONFERENCE

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 2 Apr 86 p 5

[Text] Brasilia—President Jose Sarney yesterday sharply criticized the big superpowers for continuing "to ignore the political and legal obligations they formally assumed to reverse the arms race, with the consequent reduction of the waste of resources of which so many are in such need." That was Sarney's message to the more developed nations, read yesterday morning in Geneva by Ambassador Celso Antonio de Souza e Silva during his chairmanship of the disarmament conference.

"It was with that concern, which I believe is shared by all, that I established the second priority of Brazilian foreign policy: a just economic order that may be reflected as of now in equitable procedures in the management of the debt crisis," wrote President Sarney in the message delivered by Souza e Silva. This is the first time that Brazil has presided over the disarmament conference, a position occupied in rotation by the 40 member countries.

Following is the full text of President Sarney's message read in Geneva:

"At this time, in the current month of April, when the honor of presiding over the disarmament conference falls to Brazil, I wish to reiterate in a formal and solemn manner my government's commitment to the efforts and purposes of the only multilateral forum with the mandate of the international community to negotiate measures and agreements that are of vital interest to the peace and security of all countries.

"This is the same commitment that Brazil assumed a quarter of a century ago when the 18-Nation Disarmament Committee, of which we were a member, was instituted. Since then, we have maintained the same line of conduct with absolute fidelity.

"At a recent meeting with all the ministers of state of my government, last 20 February, when I disclosed the basic guidelines of the present administration, I established the priorities of our foreign policy, the first of which is phrased in the following terms: 'Disarmament and relaxation of tensions, to which Brazil will make a contribution inspired in its tradition of conciliation, balance and realism.'

"I am certain that this priority is in accord with the apprehensions and anxieties not only of the 40 member governments of this distinguished forum, but also of all the peoples of the world. Nor could it be otherwise. While a large part of mankind nourishes itself with little more than the hope of survival, direct and indirect military expenditures approach the neighborhood of $1 trillion annually, adding a redoubled threat to the survival of all. While developing countries such as Brazil face severe sacrifices, including that of their ideal growth rate, in order to honor and settle their international commitments, the richer and superarmed countries continue to ignore the political and legal obligations they formally assumed to reverse the arms race, with the consequent reduction of the waste of resources of which so many are in such need.

"It was with that concern, which I believe is shared by all, that I established the second priority of Brazilian foreign policy: 'A just economic order that may be reflected as of now in equitable procedures in the management of the debt crisis.'

"De facto situations that only tend to aggravate the differences of wealth and power among nations have already gone on too long. Those tendencies and the negativistic expectations that nurture them must be reversed. Brazil hailed the resumption of bilateral negotiations between the United States and the Soviet Union and noted with satisfaction the common objective of their leaders that, sooner or later, mankind should live free of nuclear arms. Without relinquishing our right to express an opinion and participate in decisions taken by the big powers that may affect our interests, we follow with increased attention the proposals and counterproposals that seek to draw the conflicting positions closer together, especially of the more strongly armed nations.

"For our part and in accordance with our means, we have not spared efforts or avoided commitments that might contribute to understandings and, particularly, to enlarging the areas in which the nuclear weapon should be totally banned.

"We adopted the option in favor of its proscription in the national territory and, later, we signed and ratified the treaty proscribing nuclear weapons in Latin America. More recently, at the opening of the proceedings of the 40th Session of the UN General Assembly, last 23 September, I had the opportunity to propose the extension of that ban to the South Atlantic, when I declared that 'Brazil will exert every effort within its power to preserve the South Atlantic as an area of peace, detached from the arms race, from the presence of nuclear weapons, and from any form of confrontation originating in other regions.'

"Your combined efforts in search of common objectives, raising the collective interests of the international community above the transitory and particular interests of each one, will make it possible for the important tasks that have been entrusted to you ultimately to be fulfilled.

"With those purposes in view, and with a genuine spirit of cooperation, in the name of the Brazilian Government, I express my best wishes for the success of the present and future efforts of the disarmament conference."

8711/12859
CSO: 5200/2012

CESP OPPOSES CONSTRUCTION OF MORE POWER PLANTS

Sao Paulo GAZETA MERCANTIL in Portuguese 26 Mar 86 p 20

[Text] Rio--The construction of one more nuclear plant could compromise the investment capacity of the electric sector and aggravate the inadequate situation of the power transmission lines, which has been causing "blackouts" in the country. That warning was repeated yesterday by the director of the Sao Paulo Power Company (CESP), Joaquim Francisco de Carvalho.

According to him, it is ELETROBAS that should express its opinion about the need and the time for the construction of plants because "it has much more complete and detailed information on hydroelectric utilization and the growth of consumption of electricity." Carvalho is fighting against the tendency of the Commission on Reevaluation of the Nuclear Program to recommend the construction of another nuclear plant with German technology.

Carvalho believes that Brazil has a period of approximately 30 years to plan, build, and test a prototype of a power reactor and then to build it on an industrial scale according to demand. "We would have time to 'reinvent the wheel,' guaranteeing our autonomy in that sector without the scandalous expenditures in hard currencies. Meanwhile, KKU [presumably meant: KWU] and Siemens are against that reinvention of the wheel because if we did so those companies would lose the captive market they have in Brazil," he pointed out. Carvalho considers that the country should create its own technology in the nuclear sector as has already been done in the aeronautics sector and is being done in the informatics sector.

According to him, Brazil has more economical and technically accessible sources for the generation of energy, such as hydroelectric energy and anthracite coal, sufficient to meet demand until the year 2010. However, that will be possible if investments are made in the construction of hydroelectric power plants in accordance with the program already stipulated by ELETROBRAS. In addition to that, the hydroelectric plants should be interlinked to the national system.

Carvalho then pointed out that the excess generation of the hydroelectric plants of the Parnaiba River (Sao Simao, Itumbiara, and Emborcacao) could be transferred to the Southern Region to cover demand until the year 2000, with an average annual increase of electric energy consumption of 6.8 percent. Carvalho estimated that the country should invest $4 million per year in generation and $600 million per year in transmission.

8711/7051
CSO: 5100/2061

NUCLEBRAS CHIEF ON CONTINUING ASBORPTION OF FRG TECHNOLOGY

Rio de Janeiro JORNAL DO COMMERCIO in Portuguese 5 Apr 86 p 13

[Text] To proceed with the Angra-II and Angra-III projects and to complete the first uranium-enrichment cascade that is being built by NUCLEBRAS--those are the principal measures that the president of the company, Licinio Seabra, expects to be indicated by the Commission on Reevaluation of the Brazilian Nuclear Program, which will present a final document to the Ministry of Mines and Energy defining the fate of the country's nuclear energy, on the 19th of this month.

In an interview with the JORNAL DO COMMERCIO yesterday, Lilcinio Seabra also expressed NUCLEBRAS' interest in proceeding with the process of assimilation of German technology by the Brazilians. This would permit nationalization of the technology and preservation of the national industry that emerged from the Brazilian-German agreement signed in 1975, he argued.

The president of NUCLEBRAS declared that, at the beginning of the year 2000, Brazil will depend on nuclear energy to guarantee meeting internal demand. In order to proceed with the Angra-II construction project, the completion of which is scheduled for 1992, it will be necessary to release around 2 billion cruzados. At the present time, the rate of construction of Angra-II is quite slow, Licinio Seabra pointed out.

NUCLEBRAS is delaying its investments scheduled for this year because, thus far, the federal government has not released the funds intended for the company's overall expenditures, estimated at the beginning of the year at 23 trillion cruzeiros. An interministerial commission to reevaluate that program of overall expenditures of the state enterprise is expected to recommend a 20 percent cut in those funds to the Ministry of Mines and Energy, Licinio Seabra revealed.

Licinio Seabra reiterated that NUCLEBRAS is facing a difficult financial crisis that could result in the privatization of one of its subsidiaries, Nuclebras Monazitic Sands Corporation (NUCLEMON). This is a profitable company, very attractive to the business community, he declared. However, he discounted the possibility of another subsidiary, the Nuclebras Heavy Equipment Corporation (NUCLEP), going to private enterprise because it is already operating at more than 50 percent idle capacity.

NUCLEP is a patrimony of NUCLEBRAS, declared Licinio Seabra. He defended keeping the company under state control because he believes that in the coming years, NUCLEP will be able to compete at the international level with other companies engaged in the construction of heavy equipment for nuclear plants. NUCLEP has a physical idle capacity, he concluded, but all of its employees (about 750) are fully active.

8711/7051
CSO: 5100/2061

COMMITTEE REPORT ON TALKS WITH ARGENTINA, ACCORD WITH FRG

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 18 Apr 86 p 24

[Text] Brasilia—In a report submitted to President Jose Sarney yesterday, the committee for evaluating the Brazilian nuclear program considers it "extremely important" for Brazil and Argentina to seek more effective mechanisms for negotiation in the nuclear area so as to avoid an arms race in Latin America in the near future that would endanger the life of the planet even further.

Prepared in 180 days on instructions from the president with a view to the adoption of a new nuclear policy for the country, the report is signed by 12 scientists, professors, and experts. It also concludes that nuclear research and its gradual Brazilianization are also of great importance. On the basis of projections by the Brazilian Electric Power Companies, Inc. (ELETROBRAS), it predicts that hydroelectric potential will be exhausted sometime between the years 2010 and 2015, at which point Brazil is expected to begin consuming a minimum of 3,000 megawatts of thermoelectric power a year to satisfy the market.

According to Jose Israel Vargas, chairman of the committee, professor, and adviser to Minister Aureliano Chaves, one recommendation is to begin construction of a new nuclear power plant in 1989 at a site still to be determined. This would be in addition to the completion of work on the Angra II and III plants in Rio de Janeiro.

To ensure the continuity of the investments it considers necessary, the committee estimates expenditures on the order of $2.7 billion and proposes that several NUCLEBRAS subsidiaries be abolished to save $1.7 billion on programs already underway. In place of the firms to be abolished--NUCLEP [NUCLEBRAS Heavy Equipment, Inc.], NUCLEI [NUCLEBRAS Isotope Enrichment, Inc.], and NUCLAM [NUCLEBRAS Mining Assistance, Inc.]--the committee suggests the establishment of an ELETROBRAS subsidiary to be responsible exclusively for building and operating nuclear power plants.

It also recommends that the national commission for radiological protection and national safety be set up under the authority of the Office of the President of the Republic. That commission would be in charge of regulation, inspection, and licensing and would consist of representatives of the government, the scientific community, and society. Vargas said: "Our nuclear policy must be transparent."

With a view to restimulating the nuclear policy, which "is going badly and is in serious difficulties," according to Jose Israel Vargas, the committee is also recommending that the cooperation agreement with the FRG on the peaceful use of nuclear energy be kept in force. It is the conclusion of the committee members that society's lack of participation in the agreement signed between the two countries in 1974 is responsible for the public's current lack of faith in the Brazilian nuclear program. According to the committee, the absorption of West German technology, together with construction of another power plant, will provide Brazilian experts with the necessary know-how for creating domestic technology.

The report devotes its first paragraphs to the peaceful use of nuclear energy. As one mechanism for preventing a military dispute between Brazil and Argentina, the committee suggests that the two countries establish a system for the mutual inspection of their nuclear programs. In the opinion of the committee's chairman, the need to prevent an arms race is justified by the prospect of a nuclear war involving the world's great economic powers.

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CSO: 5100/2062

NUCLEAR POWER AGREEMENT SIGNED WITH EGYPT

PY010400 Sao Paulo FOLHA DE SAO PAULO in Portuguese 30 Apr 86 p 15

[Text] Brazil will participate in the Egyptian nuclear program by exporting technology, equipment, and possibly complete power plants. In that regard, a cooperation agreement was signed yesterday between mines and energy minister Aureliano Chaves and Egyptian Electricity and Energy Minister Mahir Abazah.

Upon leaving Minister Aureliano Chaves' office, Mahir Abazah reported that Egypt plans to build three nuclear power plants to generate electrical power through the year 2000. An international bid is being held for the construction of the first nuclear power plant worth $1.4 billion. The United States, FRG, and France are bidding to build this plant, which will put out 1,000 megawatts and whose characteristics are similar to those of the Angra 2 [power plant] under construction in Rio de Janeiro. Mahir Abrazah said that Brazil may participate in the next bids provided it is capable of competing in the international market.

The cooperation agreement, which the Egyptian minister termed an "umbrella agreement," also contemplates a general exchange of services in the electrical power supply field such as construction of hydroelectric and thermoelectric power plants and the development of unconventional energy sources.

/9274
CSO: 5100/2064

BRIEFS

ANGRA I WASTE PROBLEM--What is to be done with the 700 200-liter drums of low- and medium-level radioactive waste that are produced every year by the Angra I nuclear power plant? That big problem was brought up yesterday by Marcio Costa, manager of nuclear operations for Furnas Electric Power Plants, Inc., during the First General Congress on Nuclear Energy at the Gloria Hotel. According to Marcio Costa, NUCLEBRAS and the National Nuclear Energy Commission (CNEN) need to find a way of disposing of nuclear waste and to choose the ideal site for its permanent storage. If that problem is not solved soon--within 10 years--the lack of a site for storing nuclear waste may make the use of nuclear power in this country impossible. The waste, along with materials, clothing, and tools contaminated by radiation, is currently being placed in drums of steel and concrete and kept at a site within the power plant itself, which has room to store 7 or 8 years' worth. Highly radioactive waste, which results from burning the fuel at Angra I and is the most dangerous type, is kept in cooling ponds at the plant to allow its radioactivity to decrease. In this case as well, that waste will have to be taken sometime in the future either to a reprocessing plant or to a final storage site. [Text] [Rio de Janeiro O GLOBO in Portuguese 18 Mar 86 p 26] 11798

ITU WASTE SITE DISCUSSIONS--Itu--The atomic waste stored in Itu was again discussed by the interministerial committee comprised of representatives of the Ministry of the Environment, Ministry of Mines and Energy, the state government, and the municipality. Present at the meeting, which began at 1100 hours yesterday, were Gilberto Campos and Ivan Antunes, representatives of NUCLEMON and NUCLEBRAS. The two experts were invited to present clarifications about the material stored in Itu and the possibility of radioactive contamination at that site. Gilberto Campos, a nuclear physicist and director of NUCLEMON, declared that the material stored in Itu, known as "cake II," or crude thorium hydroxide (20 percent) and Uranium (1 percent), material that will be utilized in the future production of thorium and uranium, is not atomic waste, as is being reported. The nuclear physicist explained the reasons for the choice of Itu for installation of the storage facility and discounted the possibility of contamination. According to him, an increase of NUCLEMON's production had been anticipated and for that reason it was necessary to build a new plant and a storage facility to supply the factory. That project, which according to the director of NUCLEMON was going to generate 400 direct jobs, had to be suspended because of the people's protests. [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 8 Apr 86 p 46] 8711/7051

CSO: 5100/2061

BANGLADESH

SAFETY MEASURES FOR NUCLEAR POWER USE URGED

Dhaka THE NEW NATION in English 4 May 86 p 5

[Editorial]

When a disaster is compounded by mystery the outcome is even more unsettling. The Chernobyl nuclear disaster near Kiev in the Soviet Union could have been catastrophic for the inhabitants in a number of countries. And yet the world has been kept guessing as to what exactly happened. It is said to be the policy of the government of Mikhail Gorbachev to be more communicative on bad news. In spite of that, the habitual Soviet reticence which tends to suppress information even on plane crashes, was hardly broken except in occasional and guarded disclosures. A Soviet Embassy official, perhaps forced by circumstances, admitted before the U.S. Congress on Thursday, that the Chernobyl nuclear accident was not over and could still threaten people inside and outside the Soviet Union. This is far from the candour required at a time of international emergency. Not only the details of the accident are kept secret but casualty figures released by the Soviet government (2 fatalities and 197 injuries) are at wide variance with Western estimates. Western experts have not ruled out a melt down of the reactor in which case much higher casualties are apprehended. The Soviet Union has not lifted its blanket of secrecy and perhaps disinformation even while it is consulting Western experts on how to deal with the reactor fire. In its latest announcement the Soviet Union has only sought to reassure the world that there is no danger from radioactive fallout. But even if the leakage of radioactivity is over, the tragedy is not over as those already exposed will continue to be at risk. And those outside the Soviet Union can only speculate whether or how far the water and the environment as a whole is contaminated.

As the victim of an accident the Soviet Union has drawn international sympathy. President Ronald Reagan has expressed deep regret to the Soviet leader Mikhail Gorbachev over the accident and offered U.S. assistance. The West German Foreign Minister has said that international experts should be given the chance to visit the site of accident.

This was not the first nuclear accident but the worst so far. Almost synchronising with the Chernobyl disaster a fire broke out in a heavy water plant in Orissa in India causing fears that this might cause leakage of radioactivity if radioactive materials were stored in the plant. And this, again, was the second accident in Indian atomic plants within a few week.

Mankind is still on the threshold of the age of nuclear power. Such accidents underscore the fact that the great possibilities of nuclear energy are not untrammelled by great risks. Safety measures should be made more fool-proof and closer international cooperation in the matter should be achieved. A Swedish expert is quoted as saying that the lack of advanced computerised reactor safety system in Soviet nuclear plants could have been a major factor behind the accident.

Since the fall-out from a nuclear accident cannot be kept confined to any country and the risk is international, the development of nuclear power should not be carried on without the knowledge and participation of the others who share the same planet and same atmosphere and are equally at risk.

/13104
CSO: 5150/0103

INDIA

GANDHI VIEWS SAFETY STANDARDS IN NUCLEAR REACTORS

NK091359 Delhi General Overseas Service in English 1330 GMT 9 May 86

[Text] The prime minister, Mr Rajiv Gandhi, has said there is no scope for accidents in the nuclear power plants in the country because of the inbuilt safety features. Addressing the Consultative Committee of members of parliament of his ministry in New Delhi today, he said Indian nuclear reactors are being operated in accordance with internationally accepted safety standards. Allaying the fears of the members that a nuclear power station could explode like a bomb, the prime minister said this is a totally wrong perception since it is not physically possible for the fuel in a reactor to agglomerate in a manner that it could set off an uncontrolled nuclear chain reaction.

The members were informed that the total financial outlay of the nuclear power program is about 140,000 million rupees based on the 1983 price level. The members were informed that today the country's nuclear power program is earning between 1,500 and 2,000 million rupees a year from the sale of electricity. They were also told that availability of heavy water will not be a constraint on the nuclear power program. There are at present five heavy water plants in the country. Taking into account the profile for a 10,000 megawatt nuclear power program, three more heavy water plants are visualized. The first of these at Hazira is expected to be completed in 1991.

The members were also informed that the currently known uranium reserves of the country could support the pressurized heavy water reactor program of about 10,000 megawatt for a designed life of 30 years.

/12851
CSO: 5150/0101

NUCLEAR ENERGY CALLED ESSENTIAL FOR COUNTRY'S PROGRESS

New Delhi PATRIOT in English 18 Apr 86 p 4

[Editorial: "N-Energy for Progress"]

[Text] The government's reiteration that the country is self-reliant in the peaceful uses of nuclear technology, particularly in the field of energy, will go a long way to reassure the people that the pace of development will be speeded up to overcome the lag of the past years. India can now be justifiably proud that its nuclear scientists have not only gone ahead to establish on their own the nuclear reactors now functioning in this country; have created the facilities for the indigenous manufacture of heavy water; and have developed the required technology for the disposal of radio-active wastes. This is extremely welcome information because some people have already started crying wolf about the dangers emanating from the accumulation of used nuclear fuel. These measures have been necessary to ensure fail-safe precautions and reassure our people that no effort has been spared to make India's peaceful uses of nuclear energy not only safe but beneficial as well. Minister for Science and Technology Shivraj Patil has once again asserted that the assessed safe limits of radiation around our nuclear plants and reactors have not been crossed, and are within those prescribed by the International Commission on Radiological Protection.

There are hardly two opinions on the need for adequate supply of electricity to enable the country to progress with confidence, equipped with the tools and infrastructure to meet the demands of the twenty-first century. It is in this context that the indigenously developed fast-breeder reactor technology has become extremely useful for the nuclear energy programme for India. There is general recognition that the sources of fossil fuel depleting very fast and the search is on for reliable alternatives for maintaining and rapidly expanding the production of power. The advantage with the fast-breeder reactors is that they produce more fuel than they burn. Well-known nuclear scientist H N Sethna has pointed out that the fast-breeder reactors using thorium as the fissile material, was of particular relevance to India because the country had a huge reserve of thorium, six times more than that of uranium. Thus, fuel life could be stretched six times by using thorium in our fast-breeder reactors.

The point is that efforts have to be made to augment our power production fast, and distribute it in the most profitable areas, keeping in view the country's development programmes for rapid socio-economic progress. The most useful input in this endeavour is nuclear energy. Our indigenously developed technology has provided us the opportunity to use it to raise the standard of life of our people, the overwhelming majority of whom still suffer from lack of proper nutrition, clothing, housing and employment, to secure these imperatives for a healthy existence. The criticism of the use of nuclear energy, adverting to its presumed dangers, might prove to be only a devious way to curb this country's efforts to modernise and progress.

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CSO: 5150/0099

MINISTER ADDRESSES UN DISARMAMENT COMMITTEE

Calcutta THE TELEGRAPH in English 24 Apr 86 p 3

[Text] Geneva, April 23: India's minister of state for external affairs, Mr K. R. Narayanan, yesterday supported the efforts of the UN conference on disarmament for a comprehensive test ban treaty and the prevention of an arms race in outer space.

Addressing the 40-member UN conference on disarmament, Mr Narayanan said "With the arms race escalating on earth and reaching menacingly to outer space and with nuclear weapons acquiring an increasingly awesome capacity for world destruction and life-extinction, the question of disarmament, especially nuclear, has assumed a compulsive priority over almost every other problem facing humanity today."

Expressing "dismay" that the "conference has not been allowed to execute the mandate assigned to it" (to achieve complete and general global disarmament), Mr Narayanan said "between 1961 and now, the world has seen an unprecedented amassing of destructive weaponry in the name of security and self-defence."

He rejected the "doctrine of world peace through nuclear deterrence" as "dangerous and outdated," saying that "there have been over 130 wars in the world during the so-called "long nuclear peace'" in which "the global strategic confrontation of the great powers and the arms race...played an instigating or inflammatory role."

Measures for the avoidance of a "nuclear cataclysm" have to be accompanied "by a concrete programme for nuclear disarmament," said Mr Narayanan. He insisted that "in this regard a comprehensive test ban treaty claims the highest priority," and reiterated an earlier nonaligned call to the US to "stop nuclear weapon tests" and to the Soviet Union "to refrain from these tests" in accordance with its August moratorium. He urged the conference to constitute a committee "with an appropriate negotiating mandate" to pursue this issue. Mr Narayanan's call for multilateral negotiations clashes with the repeated American refusal to grant the conference a negotiating mandate on the issue.

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CSO: 5150/0100

PAKISTAN, INDIAN OFFICIALS DISCUSS NUCLEAR THREAT

BK191122 Karachi Domestic Service in English 1005 GMT 19 Apr 86

[Text] Pakistan has once again categorically told India that its nuclear program was absolutely for peaceful purposes and that Pakistan has neither the intention nor the resources and capability for nuclear weapon program.

This reiteration was made by Foreign Secretary Mr Niaz A. Naik during his talks with his Indian counterpart, Mr Venkateswaran, in New Delhi yesterday. The question was raised in the context of discussion on the understanding reached between President Mohammad Ziaul Haq and the Indian prime minister, Mr Rajiv Gandhi, on the 17th of December last that neither side would attack each other's nuclear installations. Draft of the agreement to this effect was almost ready.

The foreign secretary said to demonstrate its seriousness Pakistan had made a number of proposals at international, regional, and bilateral levels to achieve the objective of keeping South Asia free of nuclear weapons. He wondered why the question was still raised in India that there is concern that Pakistan's program is not entirely for peaceful purposes. Strongly refuting the allegation, the foreign secretary said this highly organized campaign was just to malign Pakistan.

The foreign secretary said both sides agreed that mutual dialogue must continue and that the momentum of progress in normalization process which had slowed in recent past must be restored. Both sides agreed to propose possible dates shortly for the meetings for subcommissions in New Delhi and a joint commission meeting in Islamabad.

The two sides are also in the process of negotiating mutually convenient date for the second round of talks between the two defense secretaries to further take up their discussions (?on) Siachen Glacier. They accepted to meet in the second half of next month.

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CSO: 5150/0092

INDIA

MINISTER ANSWERS QUESTIONS ON NUCLEAR POWER

New Delhi PATRIOT in English 17 Apr 86 p 5

[Text]

India has become self-reliant in nuclear technology, Minister of State for Science and Technology Shivraj V Patil told the Lok Sabha on Wednesday, reports PTI.

The Minister, who was during the question hour allaying fears of members that it was hazardous to have nuclear power plants and reactors, said the country had technology for the establishment, of reactors and production of heavy water. The country had also developed technology for the disposal of radio active wastes.

Replying to supplementaries Mr Patil said that nuclear power plants and reactors were not hazardous to the public.

The country needed more energy and the nuclear power would have to meet 25 per cent of the requirement.

The Government, he said, had taken steps to see that the international limit on the emission of radiation from the nuclear plants and reactors was not crossed. "There should not be any fear in the minds of the people", Mr Patil told Mr Satyendra Narayan Sinha and others.

Mr Patil said that effluents were constantly monitored to ensure compliance with prescribed limits in conformity with the International Commission on Radiological Protection Limits.

Atomic waste management had been assigned high priority from the very inception of the nuclear energy programme. Design of the nuclear power plants incorporated multiple safety systems on the fail-safe principle to ensure that effluents from the plant including gaseous and liquid radioactive releases were well within the prescribed limits during normal and postulated off-normal situations, he said.

Mr Patil contended that there were 4,000 nuclear power plants in the world and not a single person died because of radiation from these plants, as the measures adopted in the establishment of such plants were very stringent. "From this it is clear that having nuclear power reactor is not dangerous", he said.

The Minister also pointed out that the atmosphere was not free from radiation. The natural source of radiation in the atmosphere itself, he said was 85 per cent. The amount of radiation caused on account of weapons, fall-out was five per cent and occupation four per cent. The radioactive discharge from nuclear plants was only 1 per cent.

Mr Patil said that atomic energy played an important role in the energy programmes in various countries. In France 75 per cent of the energy came only from nuclear technology, Japan and America also had many such plants.

Mr Patil did not agree with Mr P Kolandaivelu that the radiation caused by the nuclear plants crippled children. The amount of radiation needed to cripple children was much higher than what was emitted by the nuclear plants.

When Mr S Jaipal Reddy said that no action had been taken on a complaint that the nuclear fuel complex near Hyderabad posed radiation hazard, Mr Patil said it was examined and found that the limit had not been exceeded.

/9317
CSO: 5150/0096

INDIA

USES OF KALPAKKAN NEUTRON SOURCE REACTOR TOLD

Bombay THE TIMES OF INDIA in English 29 Mar 86 p 15

[Article by S. Dharmarajan]

[Text] Madras, March 28--Kamini, a compact U-233-fuelled neutron source reactor, is under construction at the Indira Gandhi centre for atomic research at Kalpakkam, near here.

It is primarily meant for neutron radiography of fuel pins, sub-assemblies and other active components of the fast breeder test reactor and is expected to become operational later this year.

The neutron radiography, which has emerged in recent years as an important non-destructive test technique, is also intended to be used for space and other applications.

The source reactor of the swimming pool type is light, water-moderated and cooled by natural convection. Designed to operate at 30-KW nominal power, it can be uprated to 100 kw.

It will be housed in the basement below one of the post-irradiation examination hot cells.

The process for neutron radiography is to lower an object in front of the neutron beam through a precisely aligned guide tube that will also act as a containment to the irradiated objects.

A moving case traveling in a precisely aligned manner in the guide tube holds the object to be radiographed and it is lowered to the neutron beam level using a stepper motor lifting mechanism. It has additional safety features for lifting the irradiated object alone in case of necessity.

A specially-designed cassette drive and feed mechanism assures six to nine radiography shots to be taken without human entry into the neutron radiography area.

According to scientists, the design avoids the need for transfer of irradiated objects from the bot cells for radiography.

Kamini has facilities for radiation physics studies apart from its use for neutron radiography and activation analysis.

Key components such as a reactor tank, biological shield and water tank are ready for installation. Other essential systems such as safety control plate drives, nuclear instrumentation and experimental facilities are at an advanced stage of fabrication.

The defence laboratory at Jodphur has an indigenously-designed neutron radiography camera using CF-252 (Californium) neutron source. The camera design is based on calculations made to arrive at radiologically-safe shielded camera using iron and cadmium sheets. It works as one of the moderators and lead blocks. It helps obtain optimum thermal neutron flux in the film plane and to attain acceptable contrast and resolution in radiography.

/9317
CSO: 5150/0094

INDIA

MANY NEW AREAS WITH URANIUM POTENTIAL FOUND

New Delhi PATRIOT in English 14 Apr 86 p 5

[Text] Many new areas of fair to high uranium potential have been delineated following an integrated multi-disciplinary approach by the Atomic Minerals Division (AMD). In addition, more reserves were proved during 1985-86 in areas already taken up for drilling, reports UNI.

The largest single contribution to the ore reserves is from the Turamdih West deposit in Singhbhum district of Bihar in which an ore body with thickness upto 30 metres containing a few thousand tonnes of uranium were proved within a shallow depth of 100-150 metres.

Possibilities of open cast mining are being examined in this area, according to AMD.

Considerable progress has also been made in resource generation at Arabil (Karnataka), Mohuldih (Bihar) and Bhandaritola and Jajawal (Madhya Pradesh).

Airborne gamma ray spectrometric and magnetic (AGSM) surveys and application of remote sensing techniques were deployed to narrow down target areas for ground checking of atomic minerals. During 1985-86, airborne surveys were carried out in parts of Andhra Pradesh, Bihar, Orissa, West Bengal and Karnataka.

Contour maps for total radioactivity, uranium, thorium and potassium contents were generated for an area of 94,000 sq kms.

Following the ground survey, extensions of the radioactive quartz-pebble conglomerate with uraninite, pyrite and sporadic traces of gold have been traced in north and sourth Kanara, Shimoga, Chitradurga and Tunkur districts of Karnataka.

New horizons with both uraninite and other uranium-thorium minerals were discovered in Dhanjori formations in Singhbhum district, Bihar and in Orumahimshamni-Badampahar iron-ore sequence in Mayurbhanj district, Orissa.

During the year, systematic investigations were taken up in all the iron and iron-manganese belts of India to locate such uraniferous horizons and delineate commercially explitable resources, according to the annual report of the Department of Atomic Energy.

Investigations are in progress following the detection of significant uranium anomalies in Subansiri and West Siang district of Arunachal Pradesh, near Antri-Beharipur, in Mahendragarh district of Haryana and along the eastern margin of the Cuddapah basin in Kasturigutta, Nellore district of Andhra Pradesh.

Other localities drilled for exploration of uranium during the year were at Bhatin in Singhbhum district and Nagnaha in Palamau district of Bihar, Brijranigarh in Tehri district of Uttar Pradesh, Waljkunj, Yellaki in South Kanara district of Karnataka, Gomaghat, Philongdiloin in Khasi hills district of Meghalaya and in the Siwalik sandstones of Hamirpur basin in Himachal Pradesh and in Saharanpur district of Uttar Pradesh.

Reconnaissance surveys, sampling by drilling and laboratory investigations for estimation of heavy minerals reserve for monazite and ilmenite were carried out covering an area of 25.26 sq kms in beach and coastal dune sands

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CSO: 5150/0097

INDIA

NEW BOOK URGES EXERCISE OF NUCLEAR OPTION

Bombay THE TIMES OF INDIA in English 17 Apr 86 p 8

[Article by Inder Malhotra]

[Text]

THREE major developments recently have once again brought to the fore the nuclear issue and the grim challenges it poses to this country. The first and foremost of these is the wilful wrecking by the Reagan administration in the U.S. of the unilateral Soviet moratorium on underground nuclear testing announced eight months ago.

Mr. Gorbachov persisted with the moratorium even though the U.S. mocked his initiative not once, but twice, first just after Christmas and then just before Easter. Last week's "mighty oak" detonation in the Nevada desert, however, proved to be the proverbial last straw. Even so, while announcing the end of the moratorium, he offered to continue talking about arms control, to revert to the moratorium, if the Americans agreed to observe similar self-restraint.

The U.S. has responded, however, with the haughty declaration that nuclear testing would go on. In fact, a series of tests are in an advanced stage of preparation and almost all of them are connected with the "Star Wars" scenario, otherwise called the Strategic Defence Initiative (SDI). One, scheduled for May 8, will test a device designated "Tajo" and believed to be a warhead. Devices of even greater complexity and sophistication will be tested in subsequent detonations which are likely to continue right until early next year.

In short, any expectation that the nuclear "Big Boys" might move, however grudgingly and gradually, towards nuclear disarmament lies shattered. On the contrary, both the ABM treaty, the only genuine nuclear arms control measure agreed to, by the two superpowers, and the SALT-II, which the two sides are committed to observing, even though it has not been ratified by the U.S. Congress, are coming under increasingly unbearable strain. These two crucial accords cannot survive if, instead of being eliminated from the earth, the nuclear arms race is exported to outer space. also.

The second pertinent development to merit attention is that after nearly 14 weeks of silence on the subject, Mr. Rajiv Gandhi has spoken again of Pakistan's continuing effort to build the bomb and the inexorable logic, for India, of this relentless Pakistani pursuit.

The Prime Minister's statement, in response to widespread concern expressed during the Lok Sabha's defence debate, has to be read along with an ominous report from Washington, which neither the Americans nor the Pakistanis have cared to deny.

Flat Refusal

According to this report, the U.S. ambassador-at-large, Mr. Richard T. Kennedy has flatly refused to answer in an "open" Congressional committee session any question relating to U.S. belief or suspicion that Pakistan has attained, at its Kahuta centrifuge plant, 30 per cent enrichment of uranium, in violation of General Zia's reported assurance to President Reagan that he would restrict uranium enrichment at Kahuta to five per cent only.

There are two points about this report which are crucial, indeed critical. First, under the established norms on Capitol Hill, a top American official's refusal to discuss any matter during an open hearing, means that whatever is being alleged is true but the administration does not want to talk about it publicly.

Secondly, and more importantly, anyone capable of enriching natural uranium to the level of three per cent can easily produce weapons-grade fissile material which means enrichment to a level of over 90 per cent. The 30 per cent enrichment at Kahuta, therefore, has no great technological import. But its political implications are immense and far-reaching. Quite clearly, the Zia regime feels confident that it can go on expanding the frontiers of its bomb-building programme without putting at risk U.S. military assistance and political support as long as it refrains from actually detonating a nuclear device.

The third and most recent development is also the most serious, in fact blood-chilling. It is the outrageous U.S. attack on Libya, which has been condemned by both foes and friends, with the solitary exception of Mrs. Thatcher's Britain. But such universal condemnation has not prevented the U.S. from repeating the effrontery or from threatening to do it, yet again.

In these circumstances, is it unreasonable to conclude that to expect nuclear weapon powers never to use their deadly arsenals vis-a-vis non-nuclear nations for nuclear blackmail, if not also a limited "lesson-teaching" exercise, is nothing short of a dangerous delusion? There is, however, the spectre of the nuclear winter decimating all life even in regions far removed from the scene of a nuclear exchange. All this makes utter nonsense of the cosy belief, sedulously fostered by some, that the issue of eliminating nuclear weapons is an esoteric one, concerning Big Powers alone, and that if only India and Pakistan can agree jointly to forswear nuclear weapons the sub-continent can afford to sleep soundly.

Coherent Treatise

Against this dismal backdrop, it is both appropriate and timely that the Institute for Defence Studies and Analyses should have just published a comprehensive and coherent treatise (*) on the nuclear issue, in all its aspects, especially as it affects this country in more ways than one.

Edited by the institute's director, Mr. K. Subrahmanyam, the book does not necessarily represent the IDSA's views though all its contributors, save one, belong to it. Air Commodore Jasjit Singh has discussed exhaustively and in historical perspective the threats and challenges that nuclear weapons have posed since that awesome test in the New Mexico desert 41 years ago. He has also listed no fewer than 17 occasions on which threats of use of nuclear weapons have been held out, mostly against third world countries. Mr. C. Raja Mohan has argued painstakingly that nuclear-free zones have turned out to be more an illusion than a reality, while Mr. P. K. S. Namboodiri has dealt with the problem of nuclear terrorism on the one hand and, on the other, nuclear perceptions and policies of India and Pakistan.

All of them have done a competent job. But it is Mr. Subrahmanyam who has contributed the meatiest part of the analysis, taking up such vital questions as nuclear deterrence, role of national power, India's response to the gathering challenges and the Gorbachov proposals for the elimination of nuclear weapons by the turn of the century. The chapter clinically dissecting the endlessly controversial question of mutual inspection and verification has been written jointly by Mr. R. R. Subramanian and Mr. K. Subrahmanyam. No wonder then that the book as a whole bears the Subrahmanyam stamp.

If Mr. Subrahmanyam's views on the nuclear issue are well known, so is his formidable expertise on this highly complex and complicated subject. He has brought this to bear on the task of planning and editing the book and writing some of its most important chapters. Also, in doing so he has refreshingly refrained from being unduly vehement which is sometimes his wont. The result is a book which is extremely informative and ought to be required reading for all those who have any claim to a say on this country's nuclear policy.

Whether one agrees with the collective conclusions of the contributors or not is immaterial. What matters is that the elaborate and well-reasoned arguments in support of the book's main thesis—that if this country is really serious about its struggle for eliminating nuclear weapons from the world then it must exercise its nuclear option by 1990 or five years before the present iniquitous NPT system is to become permanent — should be weighed carefully and objectively before they are either accepted or rejected. They should not be brushed aside or applauded on the basis of prejudice or preconceived notions.

Fee To Be Paid

"If India is to make a serious intervention in the disarmament debate and contribute to nuclear disarmament, acquiring nuclear capability is a fee that has to be paid", says Mr. Subrahmanyam. The only alternative to this policy, according to him, would be to live permanently and helplessly with the nuclear weapons of "industrialised nations, their chosen client states and China", with all the risks of "coercive use of nuclear diplomacy" inherent in the situation.

The foregoing, it is needless to say, is a highly simplified summing up of a long and and complex presentation which needs to be examined in full. The same goes for the reasoning behind the contention that to think of India's nuclear predicament merely in Indo-Pakistan terms would be a grievous error.

In this connection a high point of the book is the admirably brief and lucid chapter on Indo-Pakistan nuclear options written by the only non-IDSA contributor, Ambassador Rikhi Jaipal who has a vast experience of dealing with nuclear and disarmament issues. He has quoted irrefutable evidence to show that Pakistan's, especially Mr. Bhutto's, craving for the bomb goes back to the sixties and can in no way be regarded as a reaction to Pokhran, 1974; that Pakistan's current enrichment programme has no conceivable peaceful use; that a South Asian nuclear weapon-free zone would be a legal myth; and that mutual inspection and verification between India and Pakistan would create additional irritations without solving any problem.

All in all, the IDSA book is a welcome addition to indigenous literature on the nuclear question. Most of published material on the subject is a rehash, if not a reprint, of the western position on the issue in a totally different context. The book under review examines the matter from the Indian standpoint.

It is also commendable that rather than regard his book as the last word on the subject Mr. Subrahmanyam wants it to be the starting point of a great national debate. Such a debate is long overdue. And it should be devoid of sentimentality, sanctimony and self-righteousness. Only through rationality and realism can we cope with a problem that threatens the survival not only of India and Pakistan but of the entire mankind.

India And The Nuclear Challenge, edited by K. Subrahmanyam (Lancer International, Rs. 195).

/9317
CSO: 5150/0095

INDIA

BRIEFS

IAEA VISIT PROPOSAL--Vienna, April 12 (PTI)--The International Atomic Energy Agency (IAEA) has proposed to send its operational review team to India to inspect conditions at the Tarapur nuclear power station. The agency's team leader, Mr Ferdinand L'Franzen, said there had, however, been no response from India so far. Since the team's inception in 1983, the agency had so far sent missions to South Korea, Yugoslavia, the Philippines, Pakistan, Brazil, Mexico, France and Finland. Mr M.S.R. Sarma, director of nuclear and industrial safety at the Indian Atomic Energy Regulatory Board, who is now here to attend a seminar, said the board had found the team's experience useful in evaluating Indian operational practices and procedures. [Text] [Calcutta THE TELEGRAPH in English 13 Apr 86 p 5] /9317

FIRST 500-MEGAWATT STATION--Tiruchirapalli, April 6--The country's first 500 MW nuclear power station will have been commissioned by next year though the location has not yet been decided, Mr M.R. Srinivasan, Chairman, Nuclear Power Board, told reporters here today, according to PTI. Several centres had been recommended Mr Srinivasan said, adding that Tarapur and Coodangulam in Tirunelveli district of Tamil Nadu would be more suitable than the other ones. Coodangulam, Mr Srinivasan said, was a coastal centre like Kalpakkam, making transport of heavy equipment easy. However, he pointed out that the site had to be chosen on the basis of the regional need for power. Mr Srinivasan said that the second unit of the Kalpakkam project would start functioning within a couple of days. Referring to the transformer failure in Unit One of Kalpakkam, he said that it was not true that the use of a wrong variety of oil had caused the breakdown of the transformer on March 21. [Text] [Calcutta THE STATESMAN in English 7 Apr 86 p 7] /9317

PLEA FOR MORATORIUM--New Delhi, March 28 (PTI)--Over 100 MPs belonging to different political parties today appealed to the U.S. President, Mr Ronald Reagan, to reciprocate the Soviet Union's moratorium on nuclear weapons tests. In a cable to the U.S. President, 114 MPs urged him to accept the Soviet offer before it expired by the end of this month. The MPs belong to the Congress, CPI, CPM, Telugu Desam, Janata, Forward Bloc, Congress-S, RSP, AIADMK, Asom Gana Parishad, Janwadi, National Conference and BJP. The moratorium on nuclear weapons tests, proposed by six nations including India, would pave the way for a comprehensive test ban treaty as the first stage to stop arms race and eventually to banish nuclear weapons from the world, the parliament members said. They also appealed to Mr Reagan to stop any programme for militarisation of outer space in order to take forward the spirit of the Geneva summit to fruitful negotiations and disarmament agreement. [Text] [Bombay THE TIMES OF INDIA in English 29 Mar 86 p 16] /9317

ATOMIC ENERGY COMMISSION--Dr Raja Rammana will be the chairman of the reconstituted Atomic Energy Commission. He is at present the secretary of the Department of Atomic Energy. The commission will have now nine members. The other members are : Prof M. G. K. Menon, scientific adviser to the prime minister; Mr P. K. Kaul, cabinet secretary; Dr P. K. Iyenger, director of Bhabha Atomic Research Center; Mr S Venkataramanan, finance secretary; Dr M. R. Srinivasan, chairman of the Nuclear Power Board; Mr N. Srinivasan, chief executive of heavy water projects; Mr J. R. D. Tata, chairman of Tata Sons. Ltd; and Dr (P. V. Shikantan), director of Tata Institute of Fundamental Research. [Text] [Delhi Domestic Service in English 1530 GMT 18 Mar 86 BK] /9274

HEAVY WATER PLANT--New Delhi, Apr 30 (AFP)--Hundreds of families fled in panic as a heavy-water plant caught fire in eastern Orissa state late Tuesday, the PRESS TRUST OF INDIA reported Wednesday. The blaze was triggered by a burst synthesis gas pipe line at the plant, run by the Indian Atomic Energy Department at Talcher, about 340 kilometres (212 miles) southwest of Calcutta. The fire was "devasting," the agency said, and caused hundreds of families to flee in panic. No casualties were reported, PTI said. Firefighters brought the blaze under control in about 90 minutes, the agency added. [Text] [BK301019 Hong Kong AFP in English 10008 GMT 30 Apr 86] /12851

RADIATION REPORT DENIED--The Government on Wednesday denied in the Lok Sabha that fish in the area off Kalpakkam coast was subjected to radiation from radionuclides discharged by the atomic power station, reports PTI. Radionuclides in the coastal waters--sea water, suspended silt, bottom sediments, aquatic organisms including fish and salt produced from sea water were measured routinely by the environmental survey laboratory of the health physics division, Bhabha Atomic Research Centre. [Text] [New Delhi PATRIOT in English 1 May 86 p 5] /12851

SHRIRAM 'LEAK' DENIED--New Delhi, April 27 (PTI)--The Shriram Institute of Industrial Research today denied that there was any "radioactive leak" from its applied radiation centre here. Commenting upon a report about a suspected radioactive leak at the Centre which is causing panic among the residents, Dr J. K. Nigam, director of the institute, said the allegations were "motivated and absurb." He said BARC, Bombay, had declared the safe for operation. Meanwhile, Dr S.K. Trikha, reader in Delhi university's department of physics and astrophysics, said readings on a portable Geiger counter taken outside the centre's boundary wall indicated that the radiation level was almost double the background level. Dr Nigam said the objective of the centre, was to provide utilisation of radiation energy for industrial applications. The radioactive source--eight pencils of cobalt-60 of 25,000 curies--was housed in a pool of water in a special chamber in the new building. The walls of the chamber are 1.7m thick in accordance with the specification laid down by BARC, he said. [Text] [Bombay THE TIMES OF INDIA in English 28 Apr 86 p 9] /12851

CSO: 5150/0102

PAKISTAN

PRIME MINISTER SUPPORTS NUCLEAR PROGRAM

GF291810 Lahore JANG in Urdu 28 Apr 86 p 3

[Editorial: "Repeated Assurances"]

[Text] Speaking on the occasion of the opening ceremonies of the biggest Guddu thermal power station, Prime Minister Mohammad Khan Junejo said that friendly countries should help Pakistan to acquire atomic energy. He said that Pakistan will not be deterred by any obstacles put in its way to attain nuclear energy. Pakistan, a sovereign and independent country, is not bound to offer repeated assurances for its peaceful nuclear program. Availing himself of this opportunity, he also instructed the authorities concerned not to conduct any power outages during the month of fasting.

Pakistan is openly facing a most serious crisis in the energy field. This is adversely affecting its economy. In the course of government-authorized power outages industrial and agricultural production is seriously harmed, which causes increased unemployment. New industrial programs are also shelved due to a lack of energy. Pakistan has repeatedly assured the international atomic agency, the United States, and all other countries which aid Pakistan that Pakistan does not intend to use atomic energy to produce nuclear arms. But the Indian and Jewish lobbies are constantly working against us. The inspectors of the international atomic agency have always supported Pakistan's stand on this issue. Pakistan has always kept open for inspection its atomic installations by the members of the international atomic agency. Pakistan is also ready to sign the nuclear nonproliferation treaty and the treaty for keeping the Indian Ocean and South Asia a nuclear free zone provided India does the same. But India not only refuses to sign these treaties, it also actively engages in the production of nuclear arms. The international media support this view.

Mr Dean R Hinton, the U.S. ambassador, and Mr Schifferdecker, the U.S. consul general, speaking at the above-mentioned ceremonies have expressed their doubts regarding Pakistan's assurances and have said that the United States is ready to cooperate with Pakistan in nuclear energy provided Pakistan accepts the international safeguards regarding its peaceful nuclear programs. This stance by the U.S. ambassador notes his doubts on Pakistani intentions and on past assurances given in this respect. The United States should ask for such assurances from India.

The way that Prime Minister Junejo has explained Pakistan's stance in this respect amply portrays the independent and sovereign status of Pakistan. He is absolutely correct in saying that Pakistan is not now bound to offer repeated assurances.

/12929
CSO: 5100/4744

BRIEFS

IAEA TECHNICAL ASSISTANCE--The International Atomic Energy Agency has agreed to provide technical assistance worth $450,000 to Pakistan. A decision to this effect was taken at the recently concluded meeting of the IAEA Board of Governors at Vienna. The chairman of Pakistan Atomic Energy Commission represented Pakistan at the meeting. The board, in response to a demand of Pakistan and other developing countries, also agreed to constitute a working group for the promotion of nuclear power in the less developed states. [Text] [Karachi Domestic Service in English 1005 GMT 9 Apr 86 BK] /9274

CSO: 5100/4741

BRIEFS

NUCLEAR REACTOR TRAINING COURSE--A training course on the basics of nuclear reactor technology held for a group of Syrian specialists ended at Poland's Atomic Energy Institute on 25 April. The course was set up at the request of, and was financed by, the Vienna-based International Atomic Energy Agency. [Text] [London MEED in English 10-16 May 86 p 27]/12828

CSO: 5100/4506

GABON

GOVERNMENT ABANDONS NUCLEAR POWER STATION PROJECT

AB151618 Paris AFP in French 1416 GMT 15 Apr 86

[Text] Libreville, 15 May (AFP) — Gabon has abondoned the plan to establish a nuclear power station on its territory, it was learned from a reliable Gabonese source on Thursday. The accident in Chernobyl "has affected people and it would be psychologically difficult to make people accept such a station in Gabon," this source stated, specifying that the head of state, Mr Omar Bongo, has accepted this idea.

It was recalled that Mr Bongo had asked France for the establishment of a nuclear station during President Francois Mitterrand's visit to Gabon in January 1983. The French Atomic Energy Department (CEA) — through the Societe Sofratone — had studied the possibility of establishing on an experimental basis in Gabon one or several reactors of the type that supply energy to nuclear submarines. In fact, the French nuclear stations of the PWR type (pressurized water) of 900 megawatts (Fessenheim in Alsace) or of 1,300 megawatts (Panuel in Normandie) are out of proportion with Gabon's needs.

In 1985, the highest energy requirement noted for the entire Gabonese territory was about 200 megawatts, the Gabonese Ministry of Energy indicated. The project was then left in suspension and "has not been mentioned again for more than 1 year," a French diplomatic source has affirmed. French Cooperation Minister Michel Aurillac also affirmed during his recent visit to Gabon that this matter was not mentioned during the audience granted him by President Bongo.

But France was not the only country connected with the project because a West German project which provided for the addition of a nuclear research center to the station had also been presented, a Gabonese source indicated.

Whatever the system adopted, the necessary investment would have been such that the cost of electricity of nuclear origin would have been considerably higher than that of hydroelectric energy, Gabonese and Western sources have observed. Electric power production in Gabon is ensured 75 percent by the hydroelectric network and 25 percent by fuel oil- or gas-powered station. According to the Gabonese Ministry of Energy, Gabon consumed 861 million kilowatt-hours of energy in 1985, that is about 50 times less than the network's present capacity. In its development plan, Gabon has provided for the construction of two additional hydroelectric power stations, one of (?100) megawatts at Ngoulmendjm in the Monts de Cristal (in the north Libreville) and the other at Poubara near Franceville (in the west of the country) where two stations are already in operation, a Gabonese source has specified.

/9274
CSO: 5100/22

GOVERNMENT TO SIGN NUCLEAR NONPROLIFERATION TREATY

AB150902 Lagos Domestic Service in English 0600 GMT 15 May 86

[Text] Nigeria is to sign the necessary clause in the nuclear nonproliferation treaty to enable her to expedite action on the nation's nuclear (?reactor) project. The minister of science and technology, Professor Emmanuel Emovon, announced this during a tour of the Center for Energy Research and Development at the University of Ife. He explained that this was the only condition which remains to be fulfilled.

The director of the center, Dr (Okumola Solawo), told the minister that about 1.5 million naira was required to install equipment already procured for the project. He stated that since its inception 10 years ago, more than 14 million naira had been spent on the project, while supplementary equipment will be procured as soon as funds are made available.

/9274
CSO: 5100/23

COUNTRY SENDS TREATMENT FOR CHERNOBYL VICTIMS

Johannesburg THE SUNDAY STAR in English 4 May 86 pp 1, 8

[Article by Carolyn McGibbon]

[Text] Russian health authorities this week sent an urgent SOS to South Africa appealing for scientific help to combat the catastrophic radiation releases after the Chernobyl nuclear disaster.

Latest news bulletins said a Russian suicide squad had been called in to extinguish the reactor blaze--and it was disclosed in South Africa that scientists of the University of Natal had sent to the Soviet Union details of life-saving therapy for radiation sickness.

However, this information could arrive too late for the Russian authorities to save many of the victims of radiation who have been exposed to higher than the lethal dose.

The South African therapy has been tested only on animals. Russian health authorities sent a request to scientists at Natal Medical School for details of their research and the files were sent to Moscow immediately.

America and Israel have shown interest in the research, and the scientists hope now that the South African authorities will also be interested.

The Sunday Star's Foreign News Service reports that the suicide team put out the blaze by dumping tons of water over the reactor.

Mr Christer Larsson, a Swedish scientific journalist working with satellite pictures from Kiruna, said: "The fire seems to be out, but the heat is still there. It looks as if they put out the fire by dumping tons of water on it. The men that did that, troops most likely, would be on a suicide mission.

"There is no way they could survive, no clothing that could protect them. They are dead men."

The South African discovery is based on experiments with mice, whose chances of survival after irradiation more than doubled when they were given the new medicine. This therapy has not been tried on humans suffering from radiation sickness, and disaster victims at Chernobyl could have been the first on whom it was tested.

The new therapy was developed in a laboratory at the University of Natal Medical School by an American professor, Stephen Gaffin, and a graduate medical student, Ms Michelle Wells.

Professor Gaffin estimated it could cost about R500 000 to provide sufficient medicine for 1 000 people.

Up until now no specific medicine has been developed for radiation sickness. Victims of radiation accidents have been treated in much the same way as patients with severe infections--they have been given antibiotics and carefully monitored. The only other known treatment is through expensive bone-marrow transplants.

Now there is hope through the new drug which can be manufactured from human blood.

A spokesman for the team of scientists said the treatment was aimed at patients who had been exposed to less than 1 000 rads of nuclear energy. Anyone hit by a higher dose would die within days.

The average dose that would kill a man in 450 rads--less than the energy needed to boil a teaspoon of water. One of the effects of radiation at this level is to damage cells lining the gut, releasing bacteria into the bloodstream which in turn produce poisons--endotoxins. The new medicine, says Professor Gaffin, produces antibodies to counter these endotoxins, which can wreak havoc.

Unknown members of people who have been exposed to radiation from the Chernobyl meltdown may not know they have had a lethal dose.

Initially they may have experienced loss of appetite, nausea, vomiting and headaches, but now feel no ill effects.

But harmful rays which have penetrated their bodies have damaged the intestines, destroying the protective lining and allowing bacteria and poisons into the blood.

Experiments on mice were done to try to neutralise these poisons.

The animals were flashed with between 300 and 1 000 rads and, after six days, given the new therapy.

Experiments on mice were done to try to neutralise these poisons.

The animals were flashed with between 300 and 1 000 rads and, after six days, given the new therapy.

The reason for the delay in administering the new drug called Anti-lopopolysaccharide, or Anti-LPS for short, was to mimic the possible time-lapse until victims of a nuclear disaster received treatment.

Among the mice that were not given the therapy, the survival rate was less than 20 percent. The survival rate among the mice injected with Anti-LPS was 48 percent.

The effect of the drug was to kill the bacteria and neutralise the poisons, "buying time" for the gut to repair itself and stop further leakage into the blood.

Current research shows that the Russians have been experimenting with a similar approach, but their treatment needs to be given within two days of irradiation and appears to be less effective.

The drug pioneered at Natal's Medical School has yet to be tried on humans but scientists hope that because the gut linings of mice and men are similar, there could be corresponding results.

Medium-range radiation also damages cells in the bone marrow, and the scientists believe that bone-marrow transplants alone, or in conjunction with the new therapy, would significantly improve the chances of survival of nuclear disaster victims.

Latest news on the disaster is that satellite photographs processed by the Swedish Space Corporation at Kiruna in northern Lapland have indicated that the fire is out.

A corporation spokesman said: "The latest pictures we received indicate that the smoke from the scene of the disaster has diminished. It is difficult to say anything for certain, but what we have been able to deduce is that the entire plant has now been switched off."

Sweden's main fear now is for radioactive substances already on the ground.

/9317
CSO: 5100/24

ESCOM CHAIRMAN DENIES PLANS FOR NEW NUCLEAR POWER STATION

MB070459 Johannesburg SAPA in English 2051 GMT 6 May 86

/Text/ Johannesburg, 6 May, SAPA--South Africa was not planning a new nuclear power station to come on stream before the next century, said ESCOM's /Electricity Supply Commission/ chairman Mr John Maree at a press conference today when questioned from the floor as to SA's intentions for future nuclear plants.

To have a nuclear station come on stream before the year 2000, "we would need to start commissioning one now," he said.

In fact, the opposite is true. ESCOM is shelving and delaying many of its more grandiose projects in order to trim its budgets.

Whether SA will run out of coal by the year 2050, is a speculation, as new deposits tend to be found.

ESCOM is currently deeply engrossed in cost-cutting exercises, reformulating its philosophies, planning new strategies and gearing up the gigantic parastatal into a slim-line--profitable business organization.

The new ESCOM is decentralized, with the megawatt hq functions being trimmed.

The 66,000 work force is to be axed to 60,000--although through natural depletion rather than sackings.

The middle-management strata was eliminated to allow for shorter lines of communication between the various outside divisions and top management.

The restructing took ESCOM 4 months as compared to a similar exercise in the United Kingdom which took 3 years.

Better and stricter financial managements structures have been introduced.

/12228
CSO: 5100/21

BRIEFS

SITE SOUGHT FOR NUCLEAR PLANT--A spokesman for Escom said yesterday there was no indication at this stage when or if South Africa would get a second nuclear power station. He confirmed, however, that the Natal coastline was being included in a survey to find possible future sites. Public relations officer Mr Jan Roux said a survey was being made of the whole South African coastline "and there's no reason to believe that Natal is more likely to be chosen than elsewhere." He said: "This is a long-term thing, and what we are doing is identifying possible sites which may be used in the next century if needed." Mr Roux was commenting on a letter to the Editor sent to The Daily News by a "concerned" Pinetown resident, who referred to the Chernobyl nuclear power station disaster and said he understook Escom was considering the construction of a "second Koeberg" somewhere along the Natal South Coast. Mr Roux said Escom's objective was to satisfy the customers' needs for electricity in the most cost-effective way, subject to the national interests and to resource constraints. "We have to investigate all possibilities and at the moment nuclear power is part of our energy mix. "The coastline is the most economic area bacause of inalnd water constraints." Long-term planning was needed to co-ordinate possible sites into overall plans. Otherwise a site might turn out to be in the middle of a future city. [Text][Durban THE DAILY NEWS in English 9 May 86 p 6] /12828

KOEBERG PLANS OUTLINED--Emergency plans to counter the effects of a nuclear accident at Koeberg were outlined by Health Minister Willie van Niekerk in Pretoria last night. Addressing the Medical Association of SA (Masa) AGM, he said Western nuclear reactors and those at Koeberg were developed not only to minimise accident possibilities, but also to limit the results. He said Escom's emergency plan was based on international standards and was regularly exercised. During an emergency situation, decontamination facilities were activated, injured people would be rushed to Tygerberg hospital and sirens, the SABC or Civil Defence mobile units would warn the public, he said. [Text] [Johannesburg BUSINESS DAY in English 13 May 86 p 3] /9317

CSO: 5100/24

FEDERAL REPUBLIC OF GERMANY

KARLSRUHE NUCLEAR RESEARCH CENTER EXPANDS HOT CELL PLANT

Duesseldorf HANDELSBLATT in German 5 Mar 86 p B7

[Article by nl: "Hot Cells Function with New Technology"]

[Text] The hot cell plant of the Karlsruhe Nuclear Research Center (KfK) has been enlarged by 25 percent. In addition to the new construction, the entire plant was modernized; central control engineering is expected to improve cost efficiency and safe operation of the facility. The building project took about 4 years to complete and cost approximately DM 16 million.

Hot cells are shielded, climate-controlled units in which radioactive materials can be handled by remote control. Different types of shields are used, depending on the degree of radioactivity and type of radiation of the material being examined. The KfK plant consists of five concrete cells which can handle radioactivity of up to 3.7×10^{17} becquerel (10^{7} curie), and eight "lead forts," that is, cells protected by up to 20 cm of lead which can handle as much as 3.7×10^{13} becquerel (10^{3} curie).

At the nuclear research center, these cells are mainly used for the development of radioactive materials. These materials, which range from fuel weighing a few grams to fuel elements of over 100 kg, can be studied there by remote control for structural composition, crystal structure, porosity, solidity, as well as chemical composition.

The handling is done by manipulators, i.e., remote control grip arms which can be equipped with tools. The spectrum here ranges from the electric master slave manipulator, with which the operator can perform the most precise work through force feedback, to the heavy load manipulator which can handle up to 1000 kg.

Now that the plant has been modernized, measured data obtained from the studies are fed into a central computer and processed. The same is being done with the plant's operational data, which is also processed and monitored by modern control engineering. Finally, this technology is also used to secure the safe physical operation of the plant.

The current expansion has made it possible for fuel elements from the compact sodium-cooled nuclear reactor plant to be transferred routinely into the hot cell facility and dismantled there. This is an important prerequisite for the subsequent reprocessing of breeding fuel which is to take place in a French reprocessing plant. Plans are being made for future testing of irradiated material samples which may contain the radioactive fuel tritium.

CSO: 5100/2516-P

FINLAND

LOVIISA AUTHORITIES CONTINUE LICENSING SPENT FUEL STORAGE

Helsinki HELSINGIN SANOMAT in Finnish 7 Apr 86 p 9

[Article: "Nuclear Waste Will Remain Permanently in Hastholmen; Loviisa Permits Fuel Storage"]

[Text] Loviisa (HS)--The city of Loviisa will continue to permit the storage of nuclear waste on the grounds of the Imatran Voima [Imatra Power Company] plant in Hastholmen. The Loviisa Municipal Council has decided on the matter. The city's environmental committee would, however, have preferred to get rid of the highly radioactive waste, that is, spent fuel.

Imatran Voima has had a license to temporarily store spent fuel in the nuclear power plant's storage basins, but now it is to remain in Loviisa permanently.

The fuel is cooled in water basins and usually shipped to the Soviet Union after 5 years of storage. Since damaged fuel clusters cannot, however, be transported, they will remain in Loviisa permanently. Imatran Voima has looked into the possibility of burying the spent fuel in bedrock at a depth of several hundred meters.

Mid and low-level radioactive waste is also generated in the nuclear power plant in connection with plant maintenance. It has already been agreed that holes will be blasted in bedrock to deposit such paper and cloth waste. The waste in question is now in surface storage.

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CSO: 5100/2520

FINLAND

BRIEFS

LOVIISA CONDENSER PIPES REPLACED--Loviisa (HS)--Some of the condenser pipes for the 8-year-old number-one nuclear power plant in Loviisa are being replaced. To be replaced when annual maintenance is performed, the new pipes will withstand seawater better than the old ones. Maintenance operations on the Loviisa number-two unit will begin at the end of this month or the beginning of next month. During the maintenance operations 900 workers will be working on the plant grounds in addition to Imatran Voima's (IVO) [Imatra Power Company] own people. The IVO power plantsin Loviisa normally employ 400 permanent payroll workers on the job, provided by contractors. [Text] [Helsinki HELSINGIN SANOMAT in Finnish 7 Feb 86 p 8] 11466

CSO: 5100/2520

GOVERNMENT, PRESS RESPOND TO CHERNOBYL ACCIDENT

Craxi Offers Technical Help

LD022256 Rome Domestic Service in Italian 2200 GMT 2 May 86

[Excerpts] Regarding the Chernobyl disaster, the Soviet authorities assure that everything is normal and under control. A message from Craxi to Gorbachev was delivered by the Italian ambassador to the Soviet deputy foreign minister. The latter reiterated that the situation is under control and refused Italy's offer of technical help. There is no need for it, he said.

L'UNITA on 'Absurd' News Delay

AU021039 Rome ANSA in English 1020 GMT 2 May 86

[Text] (ANSA) Rome, May 2 -- The Italian Communist Party has assailed Soviet authorities for their "faultful delay" in breaking the news of the nuclear reactor accident in Chernobyl. A front-page editorial in Thursday's edition of the party's newspaper L'UNITA charged Moscow of having been "guiltily slow" in disclosing the accident to the Soviet public and abroad. As a result of the official media blackout, "the average Soviet citizen had to turn to other, non-official sources, and add a good amount of his own imagination" to figure out what happened.

"Information becomes a rare commodity when you have to seek it out on the black market", said editorialist Fabio Mussi, assistant chief editor of L'UNITA. The Soviet habit of hushing up events "becomes all the more anachronistic and absurd" when you are dealing with "serious and important" news. The worst thing, the editorial concluded, is that "the world still does not know anything about the real situation in Chernobyl the Kiev area except for what can be gathered by conjecture".

Precautionary Measures Noted

LD021834 Rome International Service in Italian 1730 GMT 2 May 86

[Text] The civil protection minister, Zamberletti, today held a press conference in connection with the aftermath of the Chernobyl accident and the precautionary measures to be adopted. Here is a report from the Civil Protection Ministry by Augusto Milana:

If the weather forecast is right, the air which is carrying the radioactivity released by the Chernobyl plant will remain over Italy for at least another 48 hours. The new element is the spreading of radioactivity, at levels two or three times higher than normal, throughout the territory, even though these levels are well below the danger threshold. The persistence of bad weather has kept the radioactivity over our country, that is, it did not move further away as originally expected. The recent rains have caused the radioactive nuclides to penetrate the soil. With this in mind, people have been advised, for reasons of hygiene and as a precautionary measure, not only to wash fruit and not give fresh fodder to cattle, but also not to eat vegetables and not to give fresh milk to children under 10. In this case, powder or UHT milk prepared before 2 May 1986 is recommended.

Naturally, these suggestions, as Zamberletti said, are applicable for a limited period of time. If Sunday, as everyone hopes, the winds push the radioactive cloud toward the east, then from then on a period of 12 days will have to elapse before things can be said to be back to normal.

Agriculture Imports Restricted

LD021848 Rome International Service in Italian 1730 GMT 2 May 86

[Text] Today Health Minister Degan banned by decree the import of animals, animal products, and vegetables from the Ukraine. The import of animals and game from other eastern and Scandinavian countries has been prohibited. Government certifications stating that the products in question were processed before 30 April are necessary for animal products and vegetables.

/9738
CSO: 5100/2524

SPAIN

ALMARAZ REACTOR SHUTS DOWN FOLLOWING WATER LOSS

Shutdown Attributed to External Failure

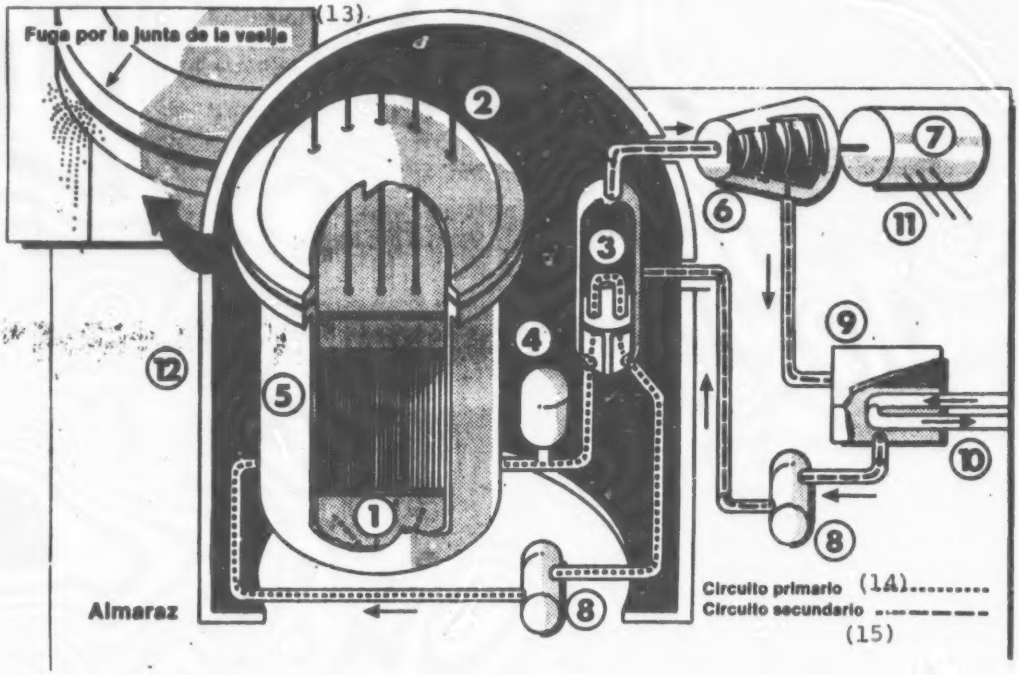
Madrid EL PAIS in Spanish 30 Apr 86 p 20

[Article by Rafael Fraguas, special correspondent]

[Text] Almaraz. Reactor no 1 of the Almaraz nuclear power plant, located in Caceres province about 200 kilometers southwest of Madrid, has been shut down since 21 April and will continue in this status for 2 more weeks. According to the plant's directors, this automatic shutdown was caused by the failure of a transformer in a Madrid electrical substation. This shutdown was then used to investigate a loss of radioactive water that circulates inside the reactor. This loss had been reported by the environmental association, ADENEX [Association for the Protection of Nature and Resources in Extremadura], on 14 April. Charges that the magnitude of the water loss may have caused this extended shutdown have been denied by the Almaraz management.

The Almaraz nuclear power plant, located in Caceres province, employs 420 workers and has a generating capacity of 1,860 MWe. The plant's management told this newspaper that the causes of the shutdown of the Almaraz reactor no 1 in the early morning of 21 April were solely attributable to the failure of a transformer in a major electrical substation located in the vicinity of Madrid, and not to the loss of water flow which was detected at the end of March in a flange attached to the container housing the plant's radioactive fuel and water. Six 400-kilovolt lines and two 220-kilovolt lines link Almaraz to the national high voltage network. The town of Almaraz has 1,312 inhabitants.

Antonio Bustamante, 35 years old, an economist, administrator and spokesman for the nuclear power plant, indicated that the Almaraz management had decided to make use of the temporary automatic shutdown caused by this external electrical failure to check the internal anomaly detected earlier in the flange of the reactor's pressure container, which in recent days had caused a loss in the irradiated water flow inside the containment device. Bustamante also reported that the reactor was operating at 100 percent of its capacity when the automatic shutdown occurred, following an electrical failure in the Madrid substation, "which also triggered shutdowns of the Zorita and Cofrentes plants," he noted.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Circuito primario (14)
Circuito secundario (15)
Almaraz
8

Key:

1. Reactor core
2. Control rods
3. Moisture separator
4. Drier
5. Container
6. Turbine
7. Alternator
8. Pump
9. Condenser
10. Cooling water
11. Electrical energy outlet
12. Shielding
13. Leak through container connection
14. Primary circuit
15. Secondary circuit

Antonio Vazquez, head of the Almaraz power plant, said that he could neither "confirm nor deny" that the loss of water flow, estimated at about 60 cubic meters of the 250 cubic meters that circulate through the nuclear container, had released gases, saying it was necessary to wait for completion of the checkout in order to evaluate that possibility, whose importance he de-emphasized. "The radioactive water was reabsorbed," stated Vazquez.

According to Antonio Bustamante, that loss, estimated at 34 liters per hour at the time when the incident occurred at the Madrid substation, was irrelevant. He emphasized that in itself it could not in any way cause an automatic reactor shutdown because of its "lack of importance." He pointed out that the loss of the container's water flow "at its maximum moment did not exceed 1.4 percent of the permissible level set by the operating specifications, 2,268 liters per hour."

Bustamante did report that a porosity of 1/3 millimeter had been found in the container's second ring. For that reason, the plant's management decided to make use of the shutdown caused by electrical induction, extending the initial shutdown for 2 more weeks, in order to ensure the reactor's tight seal.

According to Santiago Hernandez, 40, a highway engineer and president of the antinuclear environmentalists group, ADENEX, it was the complaint his group made on 14 April about the water loss which led to the information later released by the plant.

Earlier Problems

In the past there has been great touchiness toward Almaraz in the region, which has been greatly reduced today. The plant was fined twice and there have been irregularities in its operations. The fact that the daily volume of electricity generated by the plant is close to a value of 100 million pesetas is worthy of note. This earlier record lends some support to the hypothesis that the failure in the flange and the water flow loss had reached a sufficient level to force a permanent shutdown of the plant. Thus the Madrid electrical failure could have been an excuse to cover up a new irregularity.

Bustamante vigorously denied that supposition. "We are serious people. We are responsible for what we do and for what we say. We have a competent professional staff working here in Almaraz. The water flow loss in March, by itself, never warranted a permanent shutdown. Nonetheless, because of our sense of responsibility, we made use of the reactor shutdown triggered by external electrical causes, and extended it by about 3 weeks. During this period we are going to investigate this loss in depth. Believe me," he added, "there was not the slightest risk to anyone; a third of the total investment in this plant is spent for safety. And we are the people most concerned about safety here."

Nuclear Power Plant Operation

Madrid EL PAIS in Spanish 30 Apr 86 p 20

[Article by Rafael Fraguas]

[Text] Almaraz. The Almaraz nuclear power plant has two reactors, each capable of generating 2,696 thermal megawatts, 930 MW of electricity, every day, using the caloric energy transmitted by radioactive uranium to a series of water circuits.

About 73 tons of radioactive uranium in the form of rods are placed inside a shielded, hermetically sealed container, inside which liquid water circulates. This water is kept at a temperature of 348 degrees C, and is under high pressure--157 kilograms per square centimeter, which prevents it from evaporating. The radioactive uranium generates a huge amount of energy in the form of heat, which heats the water circulating in the first circuit. This water is highly radioactive.

By physical radiation, the water heated by uranium transmits its high heat to the water flowing in another circuit, parallel to but independent of the primary circuit. This is called the secondary circuit. The water inside this second circuit receives the heat from the primary circuit, cooling it.

A heat exchanger transforms the water heated by radiation into steam. The steam drives an attached turbine. The turbine converts the energy in the form of heat into mechanical energy, producing electricity through a process similar to a generator that electrically powers a bicycle headlight. The electricity is then transmitted by Spain's high voltage network.

The second water circuit is cooled by a third circuit, using water coming from the Arrocampo stream, near the plant and the Tagus River.

7679
CSO: 5100/2523

FUEL RODS IN TWO NUCLEAR REACTORS FOUND TO HAVE HOLES

Stockholm NY TEKNIK in Swedish 10 Apr 86 p 2

[Article by Tommie Ekstrom]

[Text] Sweden's two newest nuclear power plants, Forsmark 3 and Oskarshamn 3, which started operations in the fall of 1985, leak radioactivity internally. There are holes in the fuel rods, and radioactive substances escape into the reactor water, which actuates the turbines.

It is true that the contents of radioactive iodine is well below the limit value in both reactors but it is nevertheless higher than normal levels during the first working year.

Damage to the fuel of individual rods has previously been found in all Swedish nuclear power plants, but the Nuclear Power Inspection Board is concerned because the problem started already last fall, merely a few months after the commercial start of the plants.

"Tests, furthermore, show that there are holes in the rods of both reactors. For we have found neptunium 139, which is a substance that is formed in nuclear fission. That means that the uranium dioxide within the rods has direct contact with the reactor water."

The fuel rods consist of uranium dioxide pellets which are 1 cm high and 1 cm in dimater. They are stacked within a 4-meter high zirconium alloy-clad tube (a 0.8 mm thick alloy of zirconium, iron, chromium and nickel, looking like stainless steel). The tube is stopped up at either end by means of welds.

Both [illegible]ter reactors have 42,000 rods each. They are located in zirconium-alloy-clad tubes, in clusters of 64 rods.

The zirconium alloy-clad tubes are made by the Swedish company of Sandvik and the German company of Mannesmann, while Asea Atom inserts pellets, welds rods together into tubes and provides the entire fuel core.

The reactor water soars to a temperature of 286 degrees Centigrade when reaching the rods, which are between 10 and 30 degrees Centigrade hotter.

Have to Be Shut Down

If a dramatic increase in the radioactivity within the reactors occurs, they will have to be shut down, but the nuclear power plants expect to be able to replace the damaged rods during the annual revision during the summer, when they will have to be shut down anyway.

It is possible that it is merely a single rod with a large hole that is causing the leakage within the nuclear power plants, but it is likely that, in the case of Forsmark, it is a question of approximately 50 damaged rods and, in the case of Oskarshamn, 75 rods. And it is not likely that the defective rods are located in the same tube, which would simplify the replacement.

Normally, one fifth of the fuel is replaced annually, when it is considered to have been burned up.

The costs to the nuclear power plants will increase with the leakages. The supplier, Asea Atom, will incur costs of 2 million kronor per tube and approximately an additional 4-5 million kronor in inspection and replacement costs.

The operation of the reactors, incidentally, is stated to have gone smoothly, no high effects having been recorded. The water has been pure and no more corrosive than ordinary water.

The damage may have been caused by vibrations and weaknesses in the plug welds of the rods.

No radioactivity is leaking into the environment, but the reactor water and the turbines are becoming increasingly radioactive.

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CSO: 5100/2519

END

JPRS-TND-86-012

19 JUNE 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

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19 JUNE 1986

WORLDWIDE REPORT

NUCLEAR DEVELOPMENT AND PROLIFERATION

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DENMARK, GDR AGREE ON NUCLEAR DISASTER WARNING ARRANGEMENT

Copenhagen BERLINGSKE TIDENDE in Danish 1 May 86 p 2

[Article by Per Lyngby: "Nuclear Power Agreement With GDR Ready Today"]

[Text] Environment Minister Chr. Christensen (Christian Democrat) and East German permanent secretary Georg Sitzlach this morning will put the finishing touches on a warning agreement which will guarantee Denmark complete openness in case of an East German nuclear power plant accident. The Environmental Commission is investigating areas in Denmark for radioactivity in connection with the Soviet accident.

Environmental Minister Chr. Christensen and East German permanent secretary Georg Sitzlach have agreed that a possible East German nuclear power plant accident should be reported to Denmark "openly and immediately" in order to prevent the formation of rumors and in order to allow for the making of necessary arrangements. The agreement will be signed this morning.

Governments Advised Today

The Environment Minister gave the foregoing information to BERLINGSKE TIDENDE yesterday evening. He did not want to lift the veil of secrecy surrounding the Danish-East German agreement until after the parties first had advised the Danish and East German governments. That is to occur this morning.

"The negotiations have occurred in a very positive atmosphere and we have achieved clarifications with which we in Denmark can be completely satisfied," Chr. Christensen said after having negotiated during the entire evening with Georg Sitzlach at the East German Embassy in Copenhagen.

Public Should Not Be Frightened

With the Soviet nuclear power plant accident as the starting point, the two negotiators agreed that openness should be fostered in such a situation in order that the public not be frightened unnecessarily.

The environmental minister therefore is "thankful" that the Soviet ambassador in Stockholm has given assurances that in the future the Soviet Union will advise Denmark, among others, of every nuclear power plant problem.

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CSO: 5100/2522

CANADA

RADIATION REPORTED IN WAKE OF CHERNOBYL INCIDENT

Italian Salad Fixings

Ottawa THE CITIZEN in English 8 May 86 p A6

[Text]

The federal government issued a customs alert Wednesday for all European imports of fresh produce after a load of radioactive Italian salad fixings turned up in Vancouver.

As well, Health Minister Jake Epp admitted Wednesday the government has ordered fresh milk in supermarkets be tested for fallout from the accident.

The customs advisory instructs customs officials to hold all shipments of fresh fruit, vegetables and herbs of European origin for Health Department tests, spokesman Carole Peacock said.

As well, the government wants to know about any European shipments of other fresh food, including dairy products, so officials can decide whether they, too, should be tested for radioactivity.

The federal health department has decided to destroy 273 kilograms of the northern Italy produce because it contained radioactive Iodine-131, a product associated with the Chernobyl accident. Radioactive iodine can be taken up by the thyroid gland.

The produce included several kinds of specialty lettuce, specialty mushrooms and sun-dried tomatoes.

The mushrooms contained radioactivity measuring 2,300 becquerels per kilogram, more than 200 times the safe limit of 10 becquerels per kilogram. The lettuce was within the safe limit and the tomatoes were fine. A becquerel is another measure of radiation. Because the produce is for specialty markets and was unwashed, the average consumer need not worry, she said.

But Epp insisted Canadians have nothing to worry about.

The government wants to "err on the side of prudence," Epp told reporters by telephone from Geneva where he is attending a conference of the World Health Organization.

As a result of the discovery of exceptionally high levels of radioactivity in part of the Italian shipment, the department is extending its health advisory for European travellers to include much of southern Europe.

Travellers to the following countries should not drink fresh milk and should wash all fresh fruit and vegetables: the western Soviet Union, Poland, Romania, Hungary, Czechoslovakia, Greece, Yugoslavia and Italy.

The government's travel warning remains in effect. No one should visit Kiev. Pregnant women and children under the age of 16 should avoid travel to the western Ukraine and eastern Poland, including Warsaw. Expectant mothers and young children bear the greatest health risks associated with radiation poisoning.

Rainwater Measurement

Toronto THE GLOVE AND MAIL in English 9 May 86 pp A1, A2

[Article by Warren Caragata]

[Text]

Don't drink rainwater, the Government is warning Canadians after finding that rain in Ottawa this week contained radioactive iodine in amounts six times higher than federal standards allow in drinking water.

The advisory applies across the country, even though Ottawa is the only location so far where radiation has been detected in rain, a federal official said yesterday.

But Health Minister Jake Epp said from Geneva that although the rainwater radiation levels are high there is "absolutely no danger to people taking a bath in rainwater or children playing in the rain." And someone drinking the contaminated rain for a lifetime would increase the risk of cancer by only one in one million, he said.

"All of us were hoping that we Canadians would not be affected by the fallout from Chernobyl," Mr. Epp told reporters in a telephone interview from Geneva, where he is attending a meeting of the World Health Organization.

In addition to the radioactivity in rain, airborne radiation from the Soviet nuclear accident at Chernobyl has been detected in Western Canada, Toronto and Ottawa, although in minute amounts that Dorothy Meyerhof, an official with the radiation-protection bureau of the federal Health Department, said were only of "scientific curiosity."

The levels of iodine-131 in the rain were more than 10,000 times the normal level of radioactive substances found in water in the Great Lakes, she said.

The radioactive rain turned up in testing in Ottawa over a 24-hour period ending at 10 a.m. Wednesday. Iodine-131 was present in a concentration of 60 becquerels per litre. The drinking-water standard is 10 becquerels per litre. A becquerel is a measure of how radioactive a substance is.

Ms Meyerhof said the normal background level of radiation in the Great Lakes for cesium-137, another element associated with nuclear accidents and nuclear weapons tests, is one ten-thousandth of a becquerel.

Radioactive iodine is not found in background levels except after an accident or an atmospheric weapon test because it lasts only a matter of weeks. Half of it decays away every eight days.

It is considered a health hazard because it is taken up by the thyroid gland, which cannot distinguish between normal iodine and its radioactive cousin.

However, Mr. Epp said there is no need for Canadians to take iodine pills to block the intake by the thyroid.

The airborne radiation in Western Canada was measured on Tuesday. The test was run on filters from monitoring stations in Vancouver, Calgary, Edmonton, Hay River, NWT, Regina, Saskatoon and Whitehorse.

In that combined sample, iodine-131 was present in an amount measuring .0004 becquerels per cubic metre of air. But Ms Meyerhof said that the way the test is done it is impossible to say how precise the number actually is and whether the iodine was present in all the locations, or only one.

In air monitoring on Wednesday, the department measured iodine-131 in Ottawa, Toronto and Winnipeg in average concentrations of about 0.02 becquerels per cubic metre. That is about 20 times greater than the normal background level of 0.001 becquerels per cubic metre. Again, the samples from all three cities were combined so it is impossible to say whether the iodine showed up in all three locations or only one.

"That's just 20 times a little, wee number," Ms Meyerhof said, and this amount is in no way considered a health hazard.

Mr. Epp said the numbers are very low and resemble results in Canada after China tested an atomic bomb in the atmosphere in 1980.

The numbers are far below the radiation during the early 1960s when atmospheric nuclear tests were common, Ms Meyerhof said.

Testing at the rest of the 28 monitoring stations across the country on Wednesday has not turned up any radioactivity, she said.

The department is testing rainwater at the same 28 sites, but has not yet received results except for Ottawa.

Milk also is being tested. The first results are expected today.

Hector Cowan, an External Affairs Department official dispatched from the embassy in Moscow to Kiev last week to arrange for the departure of a group of Canadian students in the city, is being brought home to Ottawa for medical tests.

He received a checkup on his return to Moscow yesterday. Department spokesman Natalie Kirschberg said the results of that test are private.

Except for three students who have decided to stay and one who is planning to leave next week, all the students now have left the Ukrainian capital, 130 kilometres south of the Chernobyl nuclear power plant where an accident April 26 spewed clouds of radioactive material into the atmosphere.

The Government has changed its travel advisory for tourists in Eastern Europe.

No one should travel to Kiev and an area 400 kilometres around the city.

Travel to other areas in the Soviet Union is safe, even for those who are pregnant and under the age of 16, the two groups with the greatest risk of health problems from radiation.

However, people travelling in southern and eastern Europe should not drink milk and should wash all fresh fruit and vegetables, the Government warns. The countries include the western Soviet Union, Poland, Romania, Hungary, Czechoslovakia, Greece, Yugoslavia and Italy.

Mr. Cowan had spent about a week in Kiev and a considerable amount of time outside, Ms Kirschberg said.

He is expected to arrive in Ottawa today.

Levels in Milk Samples

Toronto THE GLOVE AND MAIL in English 16 May 86 p A5

[Text]

OTTAWA

Low levels of radiation from the Soviet nuclear accident now have been found in milk in Toronto, Ottawa and Fredericton, federal health authorities said yesterday.

Radiation from the accident site, more than 7,000 kilometres away, has been detected in rain and air samples across the country, from St. John's to Vancouver and from Windsor to Inuvik.

The concentrations of radioactive iodine-131 found in milk samples tested by the federal Government "do not present a health risk," said Carole Peacock, a spokesman for the radiation protection bureau in the federal Health Department.

The concentration of radioactive iodine has increased in Ottawa milk.

Customs officers have seized a shipment of French lettuce and herbs in Toronto that exceeded new guidelines on radiation levels in fresh produce. The new standard is 70 becquerels per kilogram.

Testing of Canadian-grown produce has so far turned up no radiation.

While government scientists tracked the fallout from the April 26 accident, which the experts say is the most serious in the history of atomic power, MPs in the Commons debated a New Democratic Party motion calling for a public inquiry into the nuclear industry in Canada.

Energy Minister Pat Carney ruled out such an inquiry, saying it would be useless until all the information about the Chernobyl accident has come in.

But "serious nuclear power accidents in Canada are extremely unlikely," she said.

The Government is "fully committed to sustaining the Candu reactor as a safe, reliable and competitive nuclear power system," she said.

New Democrat James Fulton, who proposed the motion, said a meltdown at one of the 18 reactors in Canada over their operational lifetimes is "as likely as rolling a 12 with two dice."

Mr. Fulton said that the Conservatives had promised during the 1984 election that there would be an inquiry.

Milk samples taken Wednesday in Ottawa and Toronto showed the following concentrations of iodine-131: Toronto, 0.4 becquerels per litre; Ottawa, 0.5 becquerels per litre. A sample taken Tuesday in Ottawa had a level of 0.06, about 10 times lower.

In Fredericton, milk sampled Tuesday had a level of 0.3 becquerels per litre. At one becquerel per litre, one atom of iodine is decaying, and releasing radiation, every second. However, health officials say it is a very small unit of measurement.

The maximum acceptable level in milk is 10 becquerels per litre, about 20 times above the level found in Ottawa.

In 1964, when nuclear fallout was circling the globe because of atmospheric weapons tests, the maximum concentration of iodine-131 detected in milk was 3 becquerels per litre, six times higher than the latest Ottawa result.

Levels of iodine-131 in the air have increased in Ottawa, Vancouver, Saskatoon, Regina and Winnipeg. Levels have fallen in Edmonton, Calgary, Toronto, Windsor, Fredericton and St. John's, Nfld.

Levels on Tuesday ranged between a high of 0.02 becquerels per cubic metre of air in the Regina-Saskatoon testing area to a low of 0.003 detected in the Toronto-Windsor area and Fredericton. The level in St. John's that day was zero, down from 0.0006 the day before.

In Vancouver, rain-washed radiation levels dropped from 68 becquerels per litre on Monday to 28 becquerels per litre Tuesday.

Other levels in rainwater sampled Monday were: Edmonton 18, Terrace, B.C., 11, Prince George 10, Inuvik 18.

In rainwater for the six days ending Tuesday, the following levels, measured in becquerels per litre, were found: Calgary 16, Halifax 13, Thunder Bay 12, Saskatoon 6, Hay River, NWT, 6, St. John's 5, Greenwood, N.S., 5, Quebec City 4, Winnipeg 4, Regina 3.

Miss Carney, who is the minister responsible for nuclear energy in Canada, said an accident identical to Chernobyl "cannot happen in Canada" because of significant design differences between Candu and Soviet reactors.

/9274
CSO: 5120/37

EMERGENCY MEASURES CONSIDERED IN CASE OF PICKERING ACCIDENT

Information Kits

Toronto THE TORONTO STAR in English 12 May 86 p A6

[Text] Information packages telling people what to do in case of an accident at the Pickering nuclear power station will be distributed next month, an emergency planner says. Ontario Hydro will pay the $10,000 cost of the packages.

The packages will go to 30,000 to 50,000 households within a 10-kilometre (6.2-mile) radius of the plant on Lake Ontario, says Faroukh Ali, head of plans and operations for the emergency planning department of the solicitor-general's ministry.

Antiradiation Pills

Toronto THE TORONTO STAR in English 15 May 86 p A7

[Article by Stan Josey]

[Text]

Durham Region is considering giving out anti-radiation pills to about 10,000 households near the Pickering nuclear plant.

In the wake of the nuclear plant disaster at Chernobyl in the Soviet Union, the mayors of the region's eight municipalities yesterday voted to consider mass distribution of a pill designed to protect the thyroid in case of a nuclear accident.

(The thyroid is an important ductless gland in the neck that produces a hormone regulating growth and metabolism).

The potassium iodide (KI) pills have long been the subject of controversy. Critics say that the pills protect only the thyroid, when other organs can also be damaged from radiation.

The potassium iodide is designed to block the absorption of radioactive iodine by the thyroid.

The move by the mayors, who make up the region's management committee, follows last week's call by regional council for mass distribution of evacuation information to Pickering residents.

Dr. Jean Gray, the region's medical officer of health, recommended in her report to the management committee mass distribution of the pills.

However, members of Emergency Planning Ontario have recommended against pre-distribution, saying it would be hard to ensure that all households have the pills and that residents know where the pills are at the time of an accident.

/9274
CSO: 5120/38

ONTARIO WILL NOT BLOCK SALE OF TRITIUM TO UNITED STATES

Toronto THE GLOVE AND MAIL in English 13 May 86 p A23

[Article by Linda McQuaig]

[Text] Energy Minister Vince Kerrio indicated yesterday that the province would not try to prevent Ontario Hydro from selling radioactive tritium to the United States, even if such sales increased the amount of tritium available for U.S. nuclear weapons.

Mr. Kerrio told reporters outside the Legislature that he would oppose the sale of tritium by Hydro for purposes other than those related to medical research.

However, Mr. Kerrio left open the possibility that the purchase of Canadian tritium could allow the United States to divert some of its own tritium to weapons use — a common charge by those opposed to such sales.

"I'm not sure that I would be involved in trying to tell the United States of America how to run that big nation," Mr. Kerrio said.

"I can't be somebody else's keeper," the minister added. "I can only decide what our tritium is used for."

Mr. Kerrio also said that he did not think he had the power as energy minister to block the sale.

"Hydro is an entity unto itself," he said.

NDP Leader Bob Rae said that Mr. Kerrio does have the power and he urged the Government to prevent Hydro from selling tritium.

"I don't think selling it to the United States — when there's an enormous market for tritium for military purposes — is something Ontario should be doing."

Hydro is planning to extract four kilograms of tritium a year, which is between eight and 20 times the amount needed in the world for non-military purposes, Mr. Rae said.

The federal Atomic Energy Control Board approved the sale of Canadian tritium last March. The AECB set out guidelines that it said were designed to prevent the Canadian tritium exports from being used for the production of nuclear weapons.

Hydro is building a $30-million tritium extraction plant as part of its Darlington nuclear plant to prevent the unsafe disposal of tritium, which is a byproduct of nuclear energy production.

Hydro chairman Thomas Campbell has said that Hydro may be able to sell $20-million worth of tritium a year, mostly to the United States.

/9274
CSO: 5120/39

REVIEW OF URANIUM EXPORT, FOREIGN OWNERSHIP POLICY URGED

Toronto THE GLOVE AND MAIL in English 14 May 86 p B8

[Article by Bud Jorgensen]

[Text]

MONTREAL

With the nuclear power plant disaster at Chernobyl fresh in everyone's mind, people in the uranium business have a difficult job promoting their product.

Nuclear energy had image problems even before the Soviet accident, but Gerhard Glattes, the chairman of Uranerz Exploration and Mining Ltd. of Saskatoon, argues that Canadian producers should be moving aggressively to consolidate their position as the Western World's No. 1 supplier of uranium.

Mr. Glattes said Canada should be reviewing its foreign ownership policy and its restrictions on exporting unprocessed uranium.

The Chernobyl explosion and fire should have little impact on Western uranium demand, Mr. Glattes said, because the Soviet Union had outdated technology and no containment procedures at the Chernobyl site.

"The situation there is like driving a car with no brakes," he said in a speech at the annual meeting of the Canadian Institute of Mining and Metallurgy.

In Western countries, the situation is much different as a result of the radiation leak at Three Mile Island, Penn., in 1979. After that accident, there was a thorough review of operating and safety procedures at nuclear generating stations in Western industrial countries.

Another result of the Three Mile Island accident was that several power plant projects were cancelled or delayed. Uranium producers had geared up in the expectation that nuclear power would replace hydrocarbon plants as coal and oil became more scarce and more expensive.

After several years of overproduction, however, the uranium market got back into balance in 1984, when supply and demand were roughly equal. Last year, Western customers bought 104 million pounds of uranium oxide and production was 94 million pounds. (Uranium oxide is the unprocessed mine product that is commonly known as yellowcake.)

Canada provided 31 per cent of total Western world production, with 11.7 million pounds coming from Ontario and 14.4 million from mines around Uranium City in northern Saskatchewan.

The Saskatchewan mines are generally high grade, low-cost operations and the area has substantial reserves. One deposit that would be an underground mine if developed is so high in grade that there would be severe restrictions on the amount of time workers spent in the mine because of radiation dangers.

In pressing a case for a freer market in uranium, Mr. Glattes provided the perspective of the foreign customer. His company, Uranerz, is 50 per cent owned by a subsidiary of West Germany's largest electrical utility, RWE, and 50 per cent owned by a subsidiary of Preussag AG. In West Germany, nuclear power accounts for 36 per cent of electricity generated by public utilities.

"Uranium buyers put much emphasis on long-term security of supply," Mr. Glattes said. That means they look for politically stable sources and are eager to take an equity interest in mines.

A measure of concern about supply is the willingness of several countries to invest in fast-breeder reactors, nuclear plants that are more expensive to build but are much more fuel efficient than the Candu reactor built in Canada, Mr. Glattes said.

Canadian ownership rules limit foreign participation to 33 per cent. Under certain conditions, the foreign stake could go as high as 50 per cent.

Uranerz is a joint-venture partner in the Key Lake project, the world's largest uranium mining operation. Its partners are provincially owned Saskatchewan Mining Development Corp. and Eldor Resources Ltd., a federal Crown corporation. Key Lake produced 11.1 million pounds of uranium oxide last year, which was 12 per cent of total Western world production.

Few Canadian resource companies are willing to explore and develop uranium prospects because of the uncertainties surrounding the current market situation, Mr. Glattes said.

Mr. Glattes said the United States is a market that the Canadian producers should be courting now. The other major markets with potential for Canadian producers are Europe and Japan, he said.

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CSO: 5120/39

CANADA

MISSING URANIUM FUEL PENCIL SOUGHT AT BRUCE A

Toronto THE GLOVE AND MAIL in English 14 May 86 p A22

[Article by Thomas Claridge]

[Text]

A pressure tube that ruptured in a reactor at Ontario Hydro's Bruce A Generating Station on March 28 has been removed and shipped to Chalk River, Ont., but one of six uranium fuel pencils that escaped through the crack is apparently still missing inside the reactor.

The job of finding the small, intensely radioactive cylinder and replacing the pressure tube is expected to take about a month, but a Hydro spokesman acknowledged yesterday that the shutdown could be a lot longer if inspection of the failed tube raises concerns about the condition of 479 other pressure tubes in the reactor.

Although the pressure tube and most of the fuel it contained have been removed, a thin-walled outer calandria tube that also was cracked in the rupture is still intact and serving as a temporary collector of fuel debris.

The spokesman, Michael Williams, said the immediate task confronting work crews is removal of part of a fuel pencil known to be lying on the bottom of the reactor. The plan is to reach the pencil with a grappling device inserted from the top of the reactor, raise it to the broken calandria tube and drop it through the wide crack atop the tube.

Then the debris inside the calandria tube is to be swabbed out and the tube removed and shipped to the Chalk River Nuclear Laboratories of Atomic Energy of Canada Ltd., where a metallurgical inspection of the pressure tube is already under way.

Mr. Williams said he expects the inspection will take about four more weeks, about the same time it will probably take to clean up the reactor and install the new tube assembly.

Asked about predictions by Hydro officials on the site that the Unit 2 reactor will be back in operation by June 14, Mr. Williams said he regards the date as "the earliest possible if everything goes smoothly."

The AECL official in charge of the research work at Chalk River said flasks containing the final two sections of pressure tube arrived at the laboratories yesterday morning.

Brian Cheadle, head of AECL's metallurgical engineering branch, said the first phase of the testing will be aimed at determining levels of stress at the point where the rupture is believed to have started.

He explained that in the presence of high metallurgical stress, a pressure tube that had developed a tiny crack could rupture when subjected to high pressure at low temperatures.

That was the condition in the Bruce reactor when the tube split. Operators who were having difficulty tracing a small heavy-water leak inside the reactor had decided to raise pressures inside the pressure tubes without heating up the heavy-water coolant in the tubes.

Dr. Cheadle said the second phase of the investigation will be microscopic analysis of the tube wall aimed at locating the precise point where the crack started and determining whether the tube had high levels of deuterium, a hydrogen isotope that tends to build up in the tubes.

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CSO: 5120/39

PAKS NUCLEAR PLANT BLOCK 3 FAILS TO MEET DEADLINE

Budapest MEPSZAVA in Hungarian 17 Apr 86 p 4

[Article by Tibor Flanek: "Finishing the Third One"]

[Text] According to the official deadline the third block of the Paks Nuclear Power Plant should already be in its 4th month of producing electricity, but--according to the way things now stand--we will still have to wait another 5 months for this. The delay of three-quarters of a year will cost the country the price of 700,000 tons of oil--or of another energy source with equivalent heating value.

What caused this sizable lag? Undoubtedly late deliveries by the foreign supplying partners were part of it, but weaknesses in planning and in the investment's technical preparations were also factors. These were not unknown to the power plant's builders even in the fall of 1984 when they celebrated the successful delivery of the second block before the deadline.

Since then a wave of emotion has swept through those who invest in Paks: last summer the general manager of the Hungarian Electrical Works Trust decided that instead of the Power Plant Investment Enterprise [ERBE] the Paks Nuclear Power Plant Enterprise [PAV], which operates the plant, should carry on the investment. But after some hot days and weeks emotions did cool off, and today about 600 onetime ERBE employees are working under the PAV's colors on at least delivering a flawlessly operating block by the unofficial September deadline.

Inherited Delay

"Are you progressing better now?"--I asked Janos Marton, head of the PAV's newly created investment directorate.

"The most important thing is that the arguments have ceased. The conflicts of interest which in the past pitted the ERBE and the PAV against each other have disappeared. The investor--understandably--urged delivery as soon as possible, but we considered quality to be of prime importance. Because of this we were often accused of riding the brake pedal, slowing down the work. I must admit we really did that when we saw quality being endangered, because we want a properly operating power plant rather than appearances of results. There were arguments because of this. But in the new situation, work is progressing without dissension according to our quality standards, and we are working more smoothly."

"Also faster?"

"I would not say that."

The new investment organization cannot do much any more with the inherited delay. In fact, it is not a small accomplishment that while the investment directorate, the eight chief engineering departments, and the auxiliary departments were being set up investment continued to progress at a smooth pace.

Decisive Operations

"In mid-December, when we were at a higher degree of technical preparedness than in the case of the first two blocks, we began the circulatory washing-out of the third block," says the investment director. "Beginning with this a whole series of very sensitive technical operations follows and this in effect determines the point in time when we can connect this block to the national network."

The circulatory washing was completed in less time than planned, and was followed by the first checking of the main equipment. Then on 20 March the so-called warm operation began: the entire system is running at operating pressures and temperatures, except that the nuclear heating elements have not yet been installed. The warm operation is still going on, as indicated by the rumbling heard from the depths near the turbines, which are not operating yet but which have been tested with external steam.

"We were 10 days late with this operation"--Janos Marton observes.--"But there is an explanation for it. The third block will be operating with Hungarian process control computers, with the KFKI's /Central Research Institute of Physics/ model TPA-440 machines and the MMG's /Measuring Instruments Factory/ machines. Developing the problemsolving program system and starting it up was a huge and new kind of job for the KFKI's and VEIKI's /Electric Power Industry Research Institute/ technicians. This took longer than planned.

Even so the warm operation will be completed around the 20th of April. After that the main equipment will be disassembled and rechecked for 40 days. Then they will reassemble it again and the solidity test of the 40,000 cubic meter hermetic space will begin with overpressurization. If no faults are found here either, the uranium heating elements can be inserted into the reactor and the so-called physical startup can begin.

"We are planning this for the 10th of August"--Janos Marton explains.--"After that the physicists take the necessary measurements, and we start up the reactor with a 3 percent load and test of the steam generator's safety valve. If all this goes successfully, the parallel hookup can take place. But I am not saying this in the conditional without reason: if we find problems anywhere, it means a loss of time."

/Flanek/ That is, parallel hookup of the third block may be expected for September....

"Yes. Do not ask for a more precise date. We can perhaps gain a few days but there are still very many uncertain factors. In the case of the second block, 270 days passed between the startup of the circulatory washing and the parallel hookup. We would like to do that here, too."

So the third 440 megawatt block of the Paks Nuclear Power Plant will hardly be able to supply any electricity before the last days of September, or at best by the end of August.

But having seen the millions of problems to be solved en route, it would be difficult to blame those who, while battling daily with foreign delays shipment and with the weaknesses in the plans and technical preparation, toil and make relentless demands even on themselves so that there will be a well-functioning, reliable nuclear power plant in Paks.

Among the World's Elite

Because the first two blocks are like that. Even on the coldest days of last year's memorable winter the Paks Nuclear Power Plant provided electricity with 94 percent capacity utilization when the country's other power plants were far from being able to produce at this level. It can be attributed to this very reliability that last year the two blocks, which represent barely 15 percent of the country's power plant capacity, furnished almost one-fourth of the country's electricity production. But the most recent data also say a lot: in the first quarter of this year the "availability" of block 1 was 99.96 percent and of block 2, 100.04 percent, that is, it exceeded its nominal capacity. With these indices the Paks Nuclear Power Plant surpasses all nuclear power plants of the CEMA countries, and it is one of the top 5 or 10 in the world among similarly sized nuclear power plants operating on the same principle. If block 3 and block 4 also turn out like this, with their reliable production surpassing their nominal capacity, they may counterbalance the losses caused by the delay. They can prove that there is something even more important than meeting the deadline--that is, striving for quality.

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CSO: 5100/3036

BRAZIL

UNLIKELIHOOD OF CHERNOBYL-LIKE ACCIDENT AT ANGRA DISCUSSED

Rio de Janeiro MANCHETE in Portuguese 24 May 86 pp 28-34

[Article by Claudio Figueiredo:"Could Chernobyl Happen in Brazil?"]

[Text] The accident at the Soviet power plant in Chernobyl evoked the same question all over the world, asked in the most varied languages: How dangerous are nuclear power plants, and what specific risks do they pose? Among us, the attention has been turned to our only operating nuclear power plant, on the shore of Itaorna, in Angra dos Reis, in the state of Rio: Angra I (the first one to be built of the three called for in the Brazilian nuclear program) produced 8.5 percent of the power generated for the southeast region of the country last year. And President Sarney, reflecting the overall concern over the matter, a few days after the Chernobyl accident recommended to the Ministry of Mines and Energy that it undertake a careful reexamination of the plant's security conditions.

In Brazil, a single organ holds all the responsibility for the licensing and inspection of nuclear reactors: the Reactor Department of the National Commission for Nuclear Energy (CNEN). Its director, physicist Jose Eduardo Leme Salvatore, explains: "Our mission here is to ascertain whether all the security requirements are being met. In the case of the nuclear power plants, we abide by the Brazilian security regulations, those specified by the International Atomic Energy Agency, with headquarters in Vienna, and, finally, the regulations of the design's country of origin. In the case of Angra I, it is American regulations, because the project was from Westinghouse; and it is German in the case of Angra II and III, which have a design by KWU. Before the licensing of any nuclear facility, there is made what we call an 'accident analysis.' We try to imagine everything that might go wrong in a plant: a pipe that might be perforated, a valve that could be jammed, or a pump that might break. Then, for every operating circuit, we see to it that there are three other spares to be activated in case of emergency."

It is apparently quite difficult to draw a parallel between the Chernobyl plant and Brazil's Angra I, because the two have adopted very different principles. The damaged reactor in Chernobyl was of the LWGR (light water graphite reactor) type; that is, they use water to cool the core, while the role of fission "moderator" is played by the graphite, a material subject to combustion. This is a technology which came into existence during the 1950's in the Soviet Union, but which is now obsolete, not only in the U.S., Great Britain, and France, but also in the USSR itself, where the more recent power plants have been opting for a different system.

The technology adopted by Brazil is that of PWR (pressurized water reactor) reactors; in other words, reactors using pressurized water. In them, the nuclear fuel is submerged in water; and the water itself, used for cooling the nuclear fuel, acts as a neutron "moderator" to control the so-called "chain reaction." With the proper proportions observed, a power plant of this type operates like a big tea-kettle. The water reaches temperatures exceeding 300 degrees; this radioactive water moves inside watertight piping to the steam generator where it vaporizes the water from the "secondary circuit," without coming in contact with the latter. Then the steam activates the turbines which move the generator, producing electricity. In a third, independent "circuit," there is a system for impounding water from the sea to cool, in the condenser, the steam that has expanded in the turbine. The PWR reactor line, adopted both by the American technology at Angra I and the German technology with which NUCLEBRAS [Brazilian Nuclear Corporations, Inc] is building Angra II and III, is the one used in nearly half the 345 nuclear power plants operating in the world, and in 70 percent of the 180 plants under construction.

The worst accident that could occur in a nuclear power plant would be one caused by the superheating of its core and of the fuel located there. In the case of Angra I, this would occur if there were a loss of pressurized water used to cool the core. The director of the Reactor Department, Leme Salvatore, explains: "This is quite unlikely, because we have various systems for injecting water into the core. But, based on the hypothesis that all systems can fail, the superheating of the fuel could occur, which would lead to the fusion of the uranium contained therein. The result of this could be an explosion: not a nuclear one, to be sure, which is completely impossible in a plant. It would be an explosion similar to that of a steam boiler."

The danger represented by an accident such as this would be less from the explosion per se than from the possible exposure of the radioactive material. The main guarantee against that danger lies in the reactor building of cylindrical shape, made entirely of concrete, with walls 60 centimeters thick, and in the so-called "containment vessel", another inner wall with steel walls 5 centimeters thick. That is another basic difference from the Chernobyl plant, which apparently does not have a similar security device, and had been housed in an ordinary industrial building.

Physicist Leme Salvatore explains: "In our case, assuming that all the options failed and an explosion occurred, all the radioactive material would be retained in the 'containment vessel.' This, moreover, was exactly what happened at the American plant at Three Mile Island, where there was no major damage to the environment. There, the plant has been at a standstill to date, the radioactivity levels are gradually declining and it is being decontaminated little by little, with a long term program."

Despite the explanation, one question still remains: If the "containment vessel" is the only guarantee for preventing contact of the radioactive material with the environment, couldn't it be broken by an explosion? According to the Reactor Department director, it could not: "The vessel has been built and tested to withstand a steam explosion of that type. During its construction, it is subjected to a test which must be repeated regularly later. We are not simulating an explosion, per se, but, through pressurized pumps, we subject the vessel to a pressure equivalent to that from an explosion of that type." The structures and foundations of Angra I have been planned to withstand the explosion of large dynamite charges and even earthquakes; although the posssibility of quakes in the region is virtually nil. According to the NUCLEBRAS technicians, those security standards mean that, if an earthquake were to occur there, and the towns of Angra and Parafati were destroyed, the only buildings that would still remain standing and intact would be the nuclear power plants. Nevertheless, the security standards for the Angra II and III projects have not met the stringency required in West Germany where, because of the high density of military flights, the reactor walls have been planned to withstand even the impact from a Phantom type plane.

But what if we consider the unlikely possibility that all the security devices failed and that the radioactive material really ended up being discharged from the containment vessel into the environment? For this eventuality, the so-called emergency plans have been devised, which can range from the internal area of the plant, for which the operating company, the Furnas state enterprise, is responsible, to an external plan executed with the cooperation of organs such as the town hall, the state government, the Armed Forces, the Firefighters Corps, and Civil Defense. Each one of those organs has already had the role incumbent on it in this plan determined exactly. Salvatore explains: "Radioactivity tends to disperse from the central point, and hence the emergency plan takes into consideration concentric danger areas measuring 5, 10, and 15 kilometers. Beyond that distance, it is believed that the radioactivity levels would not affect the population, making its evacuation necessary. Obviously, the radiation levels in the environment, in pastures and in agricultural production would have to be controlled."

Those in charge of security at the Angra I power plant hold an important trump card for countering the understandable distrust among the public regarding the Brazilian nuclear facilities; a distrust which only grew after the Chernobyl accident. In August of last year, the International Atomic Energy Agency, with headquarters in Vienna, pursuing its regular program of inspecting all the nuclear power plants in the Western world, sent a team of 12 specialists to Brazil to check the fulfillment of the international security regulations.

Salvatore remarks:"The result of that inspection was a very favorable report, and it contained praise not only for the action of Furnas as operator, but also for CNEN, as an inspecting and licensing organ." According to the state enterprise Furnas, the technicians' report claims that the company, "rather than merely confining itself to meeting the required minimal limits, has been exceeding the international security standards."

Despite all the guarantees, the director of the Reactor Department, Leme Salvatore, admits: "Honestly, and in good conscience, it cannot be claimed that there is a system (not only in nuclear energy, but in any system devised by man) wherein there is absolute security, and there will never even be a failure. This is non-existent, it is unrealistic. An airplane was not made to fall , but once in awhile they fall. It was not made to crash into a hill, but a pilot comes and it crashes. It cannot be claimed that there will never be some kind of accident."

Thoughts like that are most likely shared by some critics of the Brazilian nuclear program. Physicist Enio Candotti, vice president of the Brazilian Association for the Advancement of Science (SBPC), and editor of the magazine SCIENCE TODAY, is among those who think that "nuclear power plants have not yet achieved security standards that would leave scientists, technicians, and the population completely at ease."

Candotti argues: "In other countries, the population has even been consulted about the matter. In the case of countries such as Germany and Sweden, where energy sources are scarce, that rather problematical option for nuclear power was adopted only after long debates.

"In the U.S. where there are alternatives for nuclear power, the construction of new power plants has been suspended because they are also a high risk investment: Imagine the damage represented by a $2 billion plant, such as the one at Three Mile Island, stopping from one hour to the next. In Japan, another country lacking in energy, those plants are being built on far-off islands, quite distant from the population."

But what inspires physicist Enio Candotti in his opposition to the current Brazilian nuclear program is not a youthful inclination toward complete rejection of nuclear power. "It so happens that Brazil is in a rather unique situation with regard to the problem. If we can continue for many more years using conventional energy sources,then why accept the nuclear reactor technology that exists at the moment as the definitive one? Why not make use of that time to investigate and hope for a new technology in that field? Today, Sweden in particular, and Germany itself are working on a new generation of nuclear reactors that will probably be safer than the present ones. I am not opposed to nuclear energy in principle, and I think that it represents a major source of energy. I only think that we must evaluate its risks in rational terms."

The Brazilian nuclear program had already been marking time over a long period, waiting for a decision on the part of the New Republic. To reach a decision, President Sarney had assigned a commission to make a special study of the matter. The work was completed but, ironically, its conclusions (not yet disclosed) were submitted to the president shortly before the accident at Chernobyl. And this incident appears to indicate that, far from ending, that debate is only beginning.

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BRAZIL

SCIENTIFIC COMMUNITY URGES NEW EVALUATION OF PROGRAM

Brazil Building Similar Reactor

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Apr 86 p 7

[Text] "A smaller amount of radioactivity killed more than 10,000 people at Hiroshima" the physicist Jose Goldemberg, rector of the University of Sao Paulo, warned yesterday in commenting on the serious nuclear accident that occurred in the Soviet Union. Goldemberg urged that the Brazilian nuclear program be reviewed immediately because, according to him, Brazil is building a reactor of the same type as the one at the Chernobyl power station in the Ukraine.

"We need to make a re-examination at the international level to find out whether it is worthwhile to build nuclear power plants even when we are aware of the grave risks they pose," Goldemberg continued. As regards the accident in the USSR, he said he did not know the details but he pointed out that "according to some commentaries, it may have killed thousands of people" because the radioactivity "got outside the building" and affected the civilian population living nearby.

"Furthermore, it formed a cloud of radioactive gases that spread out over northern Europe" he added.

Goldemberg explained that even if it doesn't kill, a nuclear accident can cause leukemia and severe anemia "and also hereditary diseases, such as cancer." These are the serious risks faced by nearby centers of population in the USSR. "But in the next few days, with a change in wind direction, the cloud will dissipate and fall," the scientist said, reassuringly. And he insisted, once again, that "the indications we have are that the Soviet reactors, which certainly caused a leak rather than an explosion, are similar to those used by the Americans and to those built in Brazil."

Risk of Accident at Angra

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 May 86 p 14

[Text] Rio de Janeiro--Brazil could have had a nuclear accident at Angra I in October 1983 similar to the one that occurred at Three Mile Island in the United States. That is why the accident at the Chernobyl reactor in the

Soviet Union makes it essential that Brazilian authorities reappraise the German-Brazilian nuclear program and give the public reasonably clear explanations as regards the risks posed by that energy. The warning comes from Enio Candotti, assistant professor of theoretical physics at the Federal University of Rio de Janeiro (UFRJ), in whose view the nuclear program ought to be suspended, future activities limited to research, and the Angra II and III plants "frozen." His proposal even calls for deactivating Angra I, on the grounds that Brazil will not need electricity from nuclear-powered generators before the year 2015.

Mr Candotti recalled that the accidents at Three Mile Island and Chernobyl indicate the care that must be taken in selecting sites for atomic power plants. Under no circumstances should they be near major urban centers. The professor noted that Japan is developing a plan to build nuclear power plants on floating islands far from its cities.

Candotti believes that, despite the differences between the reactor at Chernobyl and the one at Three Mile Island, the two incidents demonstrate that "we are far from achieving the degree of safety and protection proclaimed by the technicians and engineers in the industry." He recounted that an accident very similar to that of Three Mile Island occurred at Angra in October 1983 and just missed exposing the core of the Angra I reactor. That accident was due to a technical failure in the cooling system. The failure was aggravated by defects in the auxiliary cooling pumps in the emergency system. According to Candotti, a disaster identical in scope to the Three Mile Island incident very nearly occurred.

He also pointed out that, although no radioactivity escaped into the atmosphere at Three Mile Island, a thermal explosion could damage the containment vessel, permitting great quantities of radiation to be released. It was "just a miracle," according to the American technicians themselves, that such an explosion did not occur at Three Mile Island.

The UFRJ professor and vice-president of the Brazilian Society for the Advancement of Science (SBPC) indicated that research toward the building of a new generation of reactors, termed "intrinsically safe," is being done in Sweden by Asea Atomic. It would be impossible under any circumstances for the core of such a reactor to be exposed to high temperatures because of a loss of refrigeration. This type of research is also being done by the United States and Germany.

Candotti's interpretation is that if millions of dollars are being spent on this research, it is because the current generation of reactors does not offer the desired degree of safety. To support his argument he cites the fact that no new nuclear power plants have been built in the United States for 8 years now and that after Three Mile Island work on those plants that were under construction was suspended and new orders were canceled.

Prof Candotti shows that nuclear energy is very expensive and the risks extremely high. Losses at Three Mile Island were $2 billion and for the first time, for different reasons, Wall Street began to agree with the ecologists that nuclear power "is not worthwhile." Furthermore, he believes that modern social movements are very sensitive to nuclear energy.

He also noted that in France, Germany, Sweden, and other European countries there are no viable alternatives since those countries do not have much choice between cold, hunger, or radiation. Brazil's situation is different. Our hydroelectric resources give us 30 years leeway "while we wait for new, safer reactors to be designed."

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BRAZIL

GOLDEMBERG CITES WEAKNESSES IN RECENT REEVALUATION STUDY

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 May 86 p 14

[Article by Jose Goldemberg, rector of the University of Sao Paulo and president of the Joint Commission of the Brazilian Society for the Advancement of Science and the Brazilian Physics Society and responsible for analyzing the nuclear issue within the present Brazilian political context]

[Text] The High Level Commission for Evaluation of the Brazilian Nuclear Program, created by President Sarney and composed of members nominated by Aureliano Chaves, minister of mines and energy, recently concluded its work after 7 months of study. The final report was not released in full; only the conclusions and recommendations were made public.

The commission conducted its studies behind closed doors, but various specialists were called to testify. They represented a wider range of opinions than the commission's six members who, with few exceptions, were not particularly knowledgeable on the subject being analyzed.

This seems to have been a deliberate decision by the members of the government who set up the commission. One can say in favor of this strategy that it avoided the presence of people who had already formed opinions that would lead to prejudgments. On the other hand, it made the commission vulnerable to the government experts who advised it, or to the government-owned companies involved; the latter certainly had many more opportunities to influence the members than specialists outside the government, whose access to the commission's working sessions was merely occasional.

At any rate, the effort represented by the establishment of the High Level Commission seems valid to us. It sets a good precedent. Why not adopt the same procedure as regards other controversial national problems? Why evaluate only the Nuclear Program and not, for example, the Alcohol Program, or the activities of Petrobras or Eletrobras?

The conclusions and recommendations of the commission, however, are disappointing for several reasons. For one thing, it tried to say too much about some issues and not enough about others.

The weakest point in the report seems to us to be the attempt to justify the need for energy generated by nuclear reactors during the coming decade (Angra II is to be finished in 1992 and Angra III in 1994) "so as to ensure the capacity to meet the anticipated demand." As is well known by specialists in the Brazilian energy sector, Eletrobras' plans are undergoing a thorough re-examination and the so-called "Plan 2000," with its revisions, cannot be considered anything more than indicative. It is known that Eletrobras was not basing its supply planning on the Angra II and III plants, despite the fact that they are mentioned in some working documents such as the National Energy Balance Sheet or the Eletrobras Sectoral Recovery Plan, which were drawn up on the basis of rather arbitrary assumptions and have been used frequently in the past to justify projects and investments.

On the question of forecasts for future energy demand, the Commission's own report is contradictory because at one point it stresses the importance of energy conservation programs that it quantifies with certainty at 9,800 megawatts of energy up to the year 2000. How can we be sure that these programs will not be even more effective, either since that is what is happening all over the world or because of the new technologies that are continually being refined in this area?

The report states, at a certain point, that it is anticipated that 3,000 megawatts of thermal origin will be needed per year in 2016 in order to satisfy the market. This is a growth of about 3 percent over the 100,000 megawatts that are supposed to be in use by then. Laying aside the surprising precision of these forecasts for a future that is so distant, what assurance do we have that the thermal complement will not be generated by using natural gas, a possibility that the report virtually failed to consider?

Having accepted these various dubious premises--which, by the way, are not much different than those that were used by the Geisel Administration and by Nuclebras in 1975 to justify the gigantic nuclear program that would have considerably increased our foreign debt if it had been carried out (eight nuclear power plants by 1990!)--,the commission became the prisoner of certain self-imposed conditions, such as that of finishing construction of Angra II and III. The cost of the nuclear program to date, and the expected outlays to complete the two plants are--curiously--minimized because the necessary $7 billion ($4.3 billion already spent) do not include financial costs (!). How shall we characterize this strange form of determining costs?

Despite this fundamental problem on which, in my view, the commission was seriously mistaken, it makes useful comments and recommendations such as proposing a radical reorganization of Nuclebras, a redefinition of the role of the National Nuclear Energy Commission, an increased nationalization--in a general way--of the Nuclear Program and greater emphasis on the training of qualified personnel. It also recommends signing an agreement with Argentina to avoid a "nuclear race" in Latin America.

The commission avoided, however, making a judgment on the centrifugal jet method of enriching uranium, a method that could cost $1 billion additional. Why this timidity in light of the conspicuous failure of this method, especially considering that development of other methods is well-advanced at Brazilian research institutes?

The general impression one gets of the report is that it accepts the difficult and dubious justification that nuclear energy is indispensable for Brazil and that it is necessary to "rescue" the current program; the commission included recommendations of lesser importance in order to accommodate the tastes of all its members.

It is uncertain what consequences the recommendations in the report will have, since many of them are disputable and will not be accepted easily, either by Nuclebras or by the National Nuclear Energy Commission--which the report recommends be dismantled. In fact, the same fate awaits Eletrobras, which would be assigned certain additional responsibilities that it probably would prefer not to have, engaged as it is in hydroelectric projects for which it does not have sufficient funds, nor by [as published] many technicians and scientists who have a different vision of the Nuclear Program.

Furthermore, the financial areas of the government will receive with the greatest skepticism any proposal to invest more funds in a program that, in practice, has been a "bottomless pit" with little possibilities of generating any return for the Treasury.

It could be said that this is the price that has to be paid for a new technology that the country is going to need in the future. Is it, however, perfectly clear that this is the case? Won't there be other ways for Brazil to resolve its energy problems and, if necessary, master the nuclear technology outside the framework of the Nuclebras Program and the close cooperation with Germany?

There are many who believe that these alternative routes exist.

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JERUSALEM RADIO VIEWS SAUDI MEDIA CALL FOR NUCLEAR WEAPONS

JN201552 Jerusalem in Arabic to the Arab World 1335 GMT 20 Apr 86

["Observation" by 'Ezra Shirazi]

[Text] Dear listeners: Those who follow the Saudi news media may conclude that Saudi news media officials seem to believe that rhetoric, honor, and heroism in the field of writing and information lie in excessively opposing Israel and in instigating against Israel and the Israeli people. The Saudi mass media, whose officials desecrate all the values of an honest press and its noble message of serving peace and coexistence between peoples and religions, daily publish written or broadcast articles and commentaries attacking Israel and peace with Israel. What is even worse and more tragic is that some Saudi information officials exploit religion and religious occasions to not only spread cheap and despicable lies against Israel and the Jewish people in general, but also to foment hatred and division between the Arab and Jewish peoples.

There is no doubt that such information officials do not only perpetrate detested and mean lies, but also distort the image of Islam and its righteous teachings. Moreover, they desecrate its message, whose essence is the same as that of other religions calling for tolerance and brotherhood among peoples and nations. As if this were not enough, the Saudi paper [AL-RIYADH] published an editorial this week announcing that the Middle East has entered the battleground of nuclear weapons and that Israel is now monopolizing this weapon. The paper also urges Arabs to acquire nuclear weapons, asserts that Arabs are compelled to possess these weapons regardless of reasons and results, and that Arabs, no matter how long it takes, will make this a major goal.

It is in this way that the Saudi media are assuming responsibility toward people and the issue of peace. They call on Arabs to have nuclear weapons regardless of reasons and results. Such a call is aimed at involving the region's peoples in a nuclear arms race and into living under nuclear fear and the nightmare of mass nuclear extermination. Saudi Arabia and its mass media behave as if the region doesn't have enough bloodshed and disaster caused by successive wars with conventional weapons. The Saudi mass media are not satisfied with all this blood, disaster, and destruction, as well as with the daily and annual waste of energy of Arabs and Israelis in arming themselves with conventional weapons. They urge people to waste more energy by arming themselves with nuclear weapons.

The least we can say about such a Saudi call is that it is an irresponsible and criminal one aimed against our region's peoples. The logic behind this call suffers from color blindness in both thinking and vision, because such a call ignores principles of negotiation, tolerance, and peace. It only sees confrontation, continued dispute, and the escalation of confrontation to the point of introducing nuclear weapons into our region, along with nuclear confrontation and mass extermination, God forbid.

The Saudi call also ignores Israel's affirmation and pledge by its present and former governments that it will not be the first to introduce nuclear weapons into the Arab-Israeli dispute. It also ignores that Israel at the United Nations and elsewhere has officially called on Arab countries, as well as all Middle Eastern countries, to reach a treaty or a collective charter for keeping the region free of nuclear weapons.

/9274
CSO: 5100/4509

PAPERS REPORT RADIATION LEAK AT CAIRO UNIVERSITY

Cobalt 'Device' Cited

NC280604 Cairo MENA in Arabic 2255 GMT 27 May 86

[Text]Cairo, 27 May (MENA)—In their 28 May editions, Cairo papers report that there has been a radiation leak from a cobalt device stored behind the commerce faculty building at Cairo University. The science faculty has been keeping the device for use in scientific research. The papers explain that the science faculty's Department of Natural Physics was keeping the cobalt bomb [qunbulat al-kubalt] device, in a room behind the commerce faculty building at Cairo University. The commerce faculty wanted to use the room for student examinations, so the device was thrown outside. Then, 400 kg of the 2,000 kg of lead that covered the radioactive material was stolen and there was also an attempt to lift the device from its place, all of which led to a radiation leak. The radioactive materials were then buried in cement and guards were posted around the 25-square-meter area affected by radiation. The papers report that studies are now underway to determine the level of radiation and to take the necessary measures to prevent further contamination.

Radiation Leak Denied

NC281344 Cairo Domestic Service in Arabic 1230 GMT 28 May 86

[Statement issued by the Egyptian Nuclear Energy Organization in Cairo on 28 May — Read by announcer]

[Text] A committee headed by the chairman and deputy chairman of the Nuclear Energy Organization, which also included the chairman of the Nuclear Safety and Organization Department and six specialists in the field of radioactive safety and control, inspected the site of the Cobalt-60 source [masdar] belonging to the Science College of Cairo University today. A committee was immediately formed to carry out the necessary tests for radioactivity. The measurements were made in the area surrounding the source and at various distances from it with the latest equipment. The committee emphasizes that there has been no radioactive leak or contamination. The Nuclear Energy Organization would like to state that the situation is quite safe, and that there is no cause for alarm.

Radiation 'Below Permissible Levels'

NC281615 Cairo Domestic Service in Arabic 1500 GMT 28 May 86

[Text] The Egyptian Atomic Energy Organization issued a statement today in which it emphasized that the situation is quite safe and satisfactory in light of the measurements that had to be made on the Cobalt-60 source (masdar] belonging to the Science College of Cairo University. Dr Salah Hashish, chairman of the Atomic Energy Organization, told our correspondent that his group sent a committee of its experts to Cairo University yesterday and again today. They carried out the necessary tests for radioactivity on the cobalt unit [wahdat] itself, the room and the surrounding areas, and places frequented by students. Dr Hashish pointed out that readings for radioactivity in these locations were below permissible levels.

The committee has submitted a preliminary report on its findings to the ministers of electricity, health, and higher education, and to the rector of Cairo University. Its final report will be prepared after a special meeting presided over by the minister of electricity, Eng Mahir Abazah. Dr Hashish emphasized that no one has been affected by radioactivity, and that the [cobalt] device is protected by a thick lead shield. He added that the theft of the shield could not have resulted in any increased doses of radioactivity for those near or far from the source.

Mubarak Contacts Officials on Device

NC290929 Cairo MENA in Arabic 0750 GMT 29 May 86

[Text] Cairo, 29 May (MENA) — President Husni Mubarak has telephoned Dr Hilmi Nammar, rector of Cairo University, to inquire about the situation pertaining to the radioactive cobalt device used by the faculty of science for research. The president requested that all measures needed to deal with the device should be taken to guarantee that no radiation would leak and to protect the students.

At a news conference, Health Minister Hilmi al-Hadid asserted that no radioactive material leaked out of the device and that there is no danger to the students. Minister of Higher Education Fathi Muhammad 'Ali held a meeting earlier today with Electricity Minister Mahir Abazah and Dr Hilmi al-Hadidi to be reassured on the situation and to take the necessary measures to deal with the situation. Four scientific groups moved to the scene of the incident and measured radiation levels, leak percentages, and levels of exposure after covering the device with a new 400-kg lead case to avoid any possibility of leakage or radiation exposure. As a precautionary measure, all 24 persons working in the area were listed and the area was placed under guard to prevent entry. Tests proved that radiation is below the hazardous level and necessary measures are now being taken to move the device to another place, which is being prepared according to all the safety specifications designed to preserve radioactive cobalt devices inside a lead casing. A scientific committee from the Health Ministry, consisting of Dr 'Isam al-Din Bakir, director of the Health Ministry's Executive Bureau; and Dr Nasif Budayr al-'Asi, head of the radiation exposure measuring division at the National Center for Radiation Technology and Research, performed a complete survey of the area. The committee submitted a scientific report asserting that:

1. The dose of radiation to which any student might have been exposed when the radiation source was left without its secondary lead casing would have been equivalent to a typical x-ray test and would have absolutely no effect on pregnant women.

2. Since the case of the radioactive device was stolen, experts at the Radiation Protection Executive Bureau of the Health Ministry, who examined the device, made a new lead casing and the radiation source now is completely safe.

3. Once the radioactive source was moved back into the room, a complete test was made of the surrounding area and proved that it is completely free of contamination.

4. Tests made before covering the device with a new secondary lead casing proved that the radiation level was below the internationally permissible limits. The minimum permissible level per week for people working with radioactive materials is 100 mm/rem, and for the general public it is 10 mm/rem. To explain this point, the report asserted that if a student remained in the vicinity of the radioactive device for one hour, the doze of exposure would not exceed 6 mm/rem/hour, which is completely harmless. If a student was within one meter of the radioactive source, the level of exposure would not exceed 1/2 mm/rem-/hour, while if a student was within 2 meters of the device, no exposure would take place.

/9274
CSO: 5100/4611

BRIEFS

GOVERNMENT RECONSIDERING NUCLEAR POWER--Cairo, 22 May (MENA)--Prime Minister Dr 'Ali Lutfi has declared that the government has decided to wait and reconsider the projects to produce electricity from nuclear energy in light of the accident at the Chernobyl nuclear reactor. In a statement following his meeting today with Engineer Mahir Abazah, minister of electricity and energy, to review the power sector's achievement will increase electricity production by using coal. It will solve all problems encountered in accomplishing this. Moreover, the government will pay special attention to using solar power instead of electricity in the upcoming 5-year development plan. The ministries of electricity, industry, and war production are working together for this purpose. [Excerpt] [Cairo MENA in Arabic 1400 GMT 22 May 86 NC] /9274

CSO: 5100/4611

RELATIVE SAFETY OF ISRAELI REACTORS CLAIMED

Tel Aviv YEDI'OT AHARONOT in Hebrew 2 May 86 pp 1, 6

[Article by Gaby Baron and Tzvi Singer: "No Reason to Fear a Catastrophe at Israeli Reactors"]

[Text] Could a catastrophe like the one that occurred at the Soviet nuclear reactor of Chernobyl happen at the reactors currently working in Israel, and should we conclude from it that Israel should in the future refrain from acquiring nuclear power plants?

As in other western countries in which the dispute between the environmentalists and the ecological preservation movements (such as the "Greens" in Germany), and the supporters of nuclear power has been renewed, it appears that in Israel, too, opinions vary on the subject.

"Israelis have no reason to fear that a nuclear catastrophe like Chernobyl may happen here," says Knesset member Professor Yuval Ne'eman. currently at the University of Texas in Austin. The relation between the power of the Soviet reactors and that of the Israeli reactors is like that between a train engine and a steam kettle... Our research reactors are miniscule and are built differently." According to him, despite all the talk about purchasing nuclear power plants, "we do not have any chance of acquiring such reactors."

During Prime Minister Shim'on Peres' visit to France, the possibility of France selling two nuclear power plants to Israel was discussed. The minister of economy and planning, Gad Ya'aqobi, yesterday told our correspondent that Israel must continue the negotiations on the purchase and erection of nuclear power plants. However, according to him, "Israel must now proceed more carefully and cautiously. We will have to reconsider the optimal location for the reactors and safety precautions, in order to preclude any danger of radioactive leakage."

Energy Minister Moshe Shahal announced that the topic of purchasing reactors is now exclusively at the theoretical stage, and that there is no actual purchase deal on the agenda."

Dr Amnon Eynav, head of the nuclear power plants project at the Ministry of Energy, added that Israel is not a signatory of the treaty against the proliferation of nuclear arms and thus is not obligated to allow international supervision of its two reactors. According to him, it should try to find ways of acquiring a nuclear power reactor without in exchange having to permit international monitoring of all the reactors in the country.

Like Professor Ne'eman, Dr Eynav, too, said that the two research reactors existing in Israel are relatively tiny compared to the Soviet and American reactors.

The French reactors, according to him, are different from the Soviet reactor, and are equipped with safety systems.

As opposed to all those who support, in principle, the acquisition of nuclear reactors, Knesset member Ya'ir Tzavan requested that, in view of the Soviet catastrophe, a parliamentary commission of investigation should be set up as soon as possible to examine all the aspects of establishing nuclear plants in Israel. "The Soviet disaster makes it necessary to study the issue in depth, especially in the light of the conditions prevailing in Israel, which is a small and densely-populated country. The prime minister's frenetic haste to sign a reactor deal with France has not been subjected to either parliamentary oversight or national public debate worthy of its name."

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CSO:5100/4508

ISRAEL

BRIEFS

SYRIA REPORTED BUILDING CHERNOBYL-TYPE REACTOR--Energy and Infrastructure Minister Moshe Shahal has revealed that Syria is currently in the midst of a process of establishing a nuclear power station similar to the one in Chernobyl. He said Egypt plans to establish five nuclear reactors of different types. Minister Shahal made these remarks during a discussion in the Knesset's Economic Committee on the issue of the desirability of purchasing reactors for Israel. Mr Shahal noted that from the security point of view any accident in a neighboring country will endanger us just as much as a reactor in Israel. [Text] [Jerusalem Domestic Service in Hebrew 1300 GMT 21 May 86 TA] /9274

FRANCE TERMINATES NUCLEAR TALKS--France has terminated negotiations with Israel over the sale of a nuclear reactor due to pressure applied by French companies that have commercial ties with Arab countries and fear the Arab boycott. This was reported by the energy minister to the Knesset Public Audit Committee. Our correspondent Elihu Ben-On reports that the committee was discussing the building of nuclear reactors following the State Comptroller's report. [Text] [Jerusalem Domestic Service in Hebrew 1300 GMT 28 May 86 TA] /6662

FRENCH DENIALS ON NUCLEAR PLANT--France says there is no truth to reports that negotiations with Israel on the possible sale of nuclear power plants have been suspended because of fears of an Arab boycott. The Voice of Israel's Paris correspondent quotes a source close to the French Foreign Ministry as saying that negotiations never got under way. The sourbe added that Prime Minister Peres discussed Israel's energy problems during his visit to Paris last fall, but no specific emphasis was given to nuclear power plants. [Text] [Jerusalem Domestic Service in English 1700 GMT 31 May 86 TA] /9274

CSO: 5100/4511

PAKISTAN

INDIA, ISRAEL SAID TO PLAN ATTACK ON NUCLEAR PLANT

GF281345 Lahore JANG in Urdu 24 May 86 p 1

[Text] London (JANG Foreign Desk) — A joint Indo-Israel plan has been finalized to attack the Pakistani nuclear plant at Kahuta. This attack may take place at any time. Israel believes that Pakistan is now quite close to manufacturing an atomic bomb and that once it is made, it would naturally help the Arab countries.

A report published in London has confirmed the news that the Government of Pakistan has strengthened its security measures around the nuclear installations at Kahuta. Air defense arrangements have also been carried out at these installations.

The report quotes an interview given by an Israeli leader which states that India and Israel, in their mutual interest, have devised a preemptive air attack on the Kahuta nuclear plant. The report adds that these two countries have a comprehensive plan to sabotage the Pakistani nuclear program.

This plan came to light when a Pakistani Air Force pilot trainee was arrested on charges of spying for Israel. The report adds that the Israeli intelligence department got this pilot enlisted in a Gulf emirate Air Force.

The officer had been sent to Pakistan twice to survey the Kahuta area. When he went to Pakistan for a third time he was arrested by the Pakistani authorities at the airport. A large amount of cash was found on his person. He was taken to Peshawar for interrogation but managed to escape with the help of a government servant. A large-scale hunt was launched by the government and he was arrested again as he tried to cross the border into India.

The report adds that Pakistani authorities suspect that a large number of Israeli agents, who have been trained in the United States, have infiltrated into Pakistani Government organizations. According to these sources, Israeli intelligence recruits agents from Third World countries who are then trained in the United States.

The report also added that an officer from the (Houston) American Academic Department revealed in a seminar held in Washington that Israel was doing its best to find out everything about Pakistan's nuclear capabilities and nuclear installations. A paper read at the seminar on this subject was later widely distributed in India.

The other day, when they attacked the Palestinian camps in Tunis, Israeli pilots made Pakistani authorities further tighten their security measures around Kahuta. Pakistani authorities do not reject the possibility of India and Israel jointly attacking Pakistan at any time.

Technical experts in Islamabad say that Israeli bombers would have to fly a distance of 1,000 miles without Indian cooperation. The possibility is, they say, that Israeli aircraft would first fly to India, then after refueling make their way to Kahuta, which would take them only a few minutes.

India would not attack Kahuta by itself, the experts say.

Pakistan, for its part, has installed ground-to-air missiles around Kahuta and a detachment of a commando force has also been assigned to look after the installations.

/9274
CSO: 5100/4746

PAKISTAN

BRIEFS

OFFICIAL ON RADIATION LEVEL--Chairman of the Pakistani Atomic Energy Commission Munir Ahmed Khan has said there has been no significant rise in radiation levels in Pakistan territory or its atmosphere because Pakistan is situated well away from Chernobyl. Speaking to a news conference in Islamabad today, he said that as of the 10th of this month there was no noteworthy increase in radiation. However, there was a moderate increase from the 11th to the 17th of this month, which has already started coming down. He said a thorough analysis of the specimens of food and physical matter shows that so far there has been only a slight increase in radiation levels, which is not so significant. He said sophisticated instruments were used in measuring the level of radiation. [Text] [Karachi Overseas Service in Urdu 0800 GMT 25 May 86 BK] /9274

CSO: 5100/4746

NIGER

BRIEFS

URANIUM PRODUCTION TO CONTINUE--Niamey, 22 May (AFP)--Uranium production in Niger is to continue, the managing directors of uranium exploiting companies assured yesterday. The managing directors of the Akouta Mining Company (COMINAK), the Air Mining Company (SOMAIR), and the General Nuclear Materials Company (COGEMA), who came to brief President Seyni Kountche on the outcome of the COMINAK and SOMAIR boards of governors meeting, stated that "despite the difficulties caused by the crisis" the accounts of the 1985 exercise were approved, and the companies ended the year "under acceptable conditions." [Text] [Paris AFP in English 2100 GMT 22 May 86 AB] /9274

CSO: 5100/25

BRIEFS

RESEARCHERS' INTEREST IN NUCLEAR ENERGY--Nigeria has no plan to go nuclear until government approves the establishment of the proposed National Energy Commission, Professor Tam David-West has said. According to the minister, twenty-six applications have so far been processed from researchers in the country seeking the ministry's assistance in the form of training courses, fellowship, symposium and employment in various fields of useful applications of nuclear energy. He added that as a member of the International Atomic Energy Agency (IAEA), his ministry, will reorganise and intensify its efforts on energy as soon as government approves the commission. Professor David-West also said that to ensure the enforcement of safety standards in the country, National Electric Equipment Testing laboratory, (NEETL) now under construction in Jos would be completed during the fifth development plan period. [Text] [Lagos DAILY TIMES in English 3 May 86 p 24] /8309

CSO: 5100/27

BRIEFS

NO SHORT-TERM NUCLEAR PLANT--Prime Minister Cavaco Silva affirmed yesterday in London that his government "only agreed to review the National Energy Plan," explaining that his government does not intend to grant any "short-term or medium-term" authorization for the installation of a nuclear power plant in Portugal. The prime minister thus clarified statements that were attributed to him during the interview he granted the BBC in the British capital. It should be noted that Cavaco Silva had admitted the possibility of a nuclear power plant in Portugal "in the near future," an issue which he had said was being studied. Cavaco Silva emphasized that the only thing in existence is "the previous' government's White Paper, and the present government only agreed to review these projects." He added that "there is absolutely nothing in relation to the nuclear option." [Excerpts] [Lisbon DIARIO DE NOTICIAS in Portuguese 14 May 86 p 2] /13045

CSO: 5100/2526

NUCLEAR REACTOR TALKS HALTED

TA261520 Ankara ANATOLIA in English 1510 GMT 26 May 86

[Text] Ankara, 26/5 (A.A.) — Talks related to the first nuclear power plant of Turkey at Mersin, Akkuyu came to a halt.

While the talks underway with the Canadian Atomic Energy of Canada Ltd (AECL) company were stopped, a preliminary agreement between the Turkish Electricity Authority, a state economic enterprise responsible for the generation, supply and transmission of electric power in Turkey, and the AECL, on the basis of the "build operate transfer" model expired in March.

The A.A. reporter was informed that the high-level talks on a joint funded company to carry on the nuclear power plant project came to a halt because the Turkish Government refused to issue guarantee a 1.1 billion Canadian dollar loan to be extended by the Canadian Government for the Akkuyu nuclear power plant.

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CSO: 5100/2529

END

JPRS-TND-86-013

1 JULY 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

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NOTICE

The following selections from Soviet media on the aftermath of the Chernobyl Nuclear Power Plant accident and the mobilization of labor and technology in the clean-up effort will be published in the series USSR REPORT: POLITICAL AND SOCIOLOGICAL AFFAIRS under the subtitle AFTERMATH OF CHERNOBYL NUCLEAR POWER PLANT ACCIDENT. This is a representative list of the items selected for that report.

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PEOPLE'S REPUBLIC OF CHINA

DEVELOPMENT OF NUCLEAR INDUSTRY AIMS AT PEACEFUL USES

Beijing JINGJI RIBAO in Chinese 22 Jan 86 p 1

[Article by NCNA corresponts Li Shangzhi [2621 1424 1807], and Yu Jiafu [5713 0159 1788]: "The Peaceful Utilization of Nuclear Energy Is the Basic Policy of China's Development of the Nuclear Industry"]

[Text] Beijing, 21 January (NCNA)--This afternoon party and state leaders Hu Yaobang, Fang Yi, Li Peng, Yang Shangkun, and Hao Jianxiu, joyfully came to Huairen Hall at Zhongnanhai, where they shook hands and greeted 10 experts who have made contributions to the development of China's nuclear industry. Together they sat down and discussed the problems of our country's nuclear industry's peaceful utilization of nuclear energy and our leaders requested that the experts convey their regards to the employees on the nuclear industry front.

The leadership cadre first had a commemorative group photo taken with the experts. Hu Yaobang and Yang Shangkun in separately taking the hands of Jiang Shengjie [1203 5110 7132] and Wang Ganchang [3769 3227 2490] said, "Elderly comrades sit in the front." After these two elderly experts sat in the midst of the leadership cadre Li Peng and Hao Jianxiu allowed Liu Xingzhong [0491 5281 1813], Min Huizhong [7036 5069 0022], Huang Qitao [7806 7871 7118], Yu Min [0060 2404], ?Lian? Peisheng [1014 3932], Qian Gaoyun [6929 4108 7301], Lu Dexian [0712 1779 6364], and Sun Zuxun [1327 4371 6064] and other experts to go to the front. An expert said, "Elders Jiang and Wang represent us." In the midst of everyone's laughter a group photo was taken. During the symposium the central government leadership cadre wholly affirmed the accomplishments made to the development of our country's nuclear industry by the vast number of employees in the Ministry of Nuclear Industry. General Secretary Hu Haobang excitedly said that the nuclear industry front comrades have made precious contributions to the party, the state, and the people. Through their hard work our country has successfully developed nuclear weapons strengthening our country's national defensive strength. At the present time our country has set up a fairly complete nuclear industry system and it has good quality nuclear industry ranks. This is a very great accomplishment. The Party Central Committee, State Council, the Central Military Commission, and the people cannot forget the historical and glorious contributions that they have made. He hoped that the personnel of the Ministry of Nuclear Industry in being expert in one thing and good at many will be engaged in a lot of diversification which positively supports local civilian utilized industries and which will be of development to the civilian utilized industries in making new contributions to the socialist economic construction.

Comrade Li Peng said that for more than 30 years the employees of our country's nuclear industry have relied on their own efforts and arduously struggled to construct a fairly complete nuclear industry system. (For this reason) the quality of our nuclear industry ranks is definitely very good. Although our nuclear technology is still not very advanced there still are not very many countries in the world with this kind of organization.

Comrade Li Peng said that for the purpose of hastening our country's socialistic modernization construction our country's nuclear industry organizations are faced with problems of how to better and more extensively peacefully utilize nuclear energy. The peaceful use of nuclear energy is the basic policy of our country's development of nuclear industry. In this aspect nuclear industry has vast developmental prospects and in the aspect of civilian use it has vast potential. In doing the work on the industries for civilian use the nuclear production of electricity is primary and other industries should be worked on. Although the pace of our nuclear production of electricity is arduous it has already moved forward. To carry out the nuclear production of electricity we should primarily take the route of self-reliance and also the route of importing foreign advanced technology.

Comrade Fang Yi said that we should maintain nuclear industry research ranks and strengthen research into the peaceful utilization of nuclear energy. The scientific and technical personnel of the nuclear industry organizations should work together with universities and localities. This route will become more and more extensive and its future is bright.

Comrades Yang Shangkun and Hao Jianxiu also spoke. They affirmed the work of the nuclear industry front and hoped that the employees would make new accomplishments in the peaceful use of nuclear energy. In the midst of warm talks 10 experts expounded numerous opinions and proposals.

The Ministry of Nuclear Industry's minister, Jiang Xinxiong [5592 1800 2651] and vice-minister, Chen Zhaobo [7115 5128 0591], the National Defense Science, Technology, and Industry Commission chairman, Ding Henggao [0002 5899 7559], the political commissar, Wu Shaozu [0124 4801 4809], and the chairman of the Science and Technology Committee, Zhu Guangya [2612 0342 0068] took part in the symposium.

12670/12232
CSO: 5100/5

REPORTAGE ON PROJECTED FOURTH NUCLEAR PLANT

AEC Seeks 2-year Postponement

OW122043 Taipei CNA in English 1441 GMT 12 May 86

[Text] Taipei, 12 May (CNA)--The Atomic Energy Council [AEC] hopes that the construction of the fourth nuclear power plant will be postponed for at least two years, AEC Chairman Dr Yen Chen-hsing said Monday in a Legislative Yuan committee meeting.

Yen made the statement when answering interpellations concerning the safety of nuclear power generation by legislators Cheng Yu-cheng, Liang Hsu Tsun-chu, Chou Shr-fu and several others in the budget screening committee's meeting held behind closed doors.

The legislators told local reporters that Yen Chen-hsing expressed in the committee meeting his dissatisfaction with the Taiwan Power Company's handling of nuclear power generation. For instance, they said, Yen complained that Taipower has not yet submitted to the Atomic Energy Council any reports on the evaluation of environmental effects or safety of the projected 4th nuclear power plant.

As a scientist, Yen said, he would like to express his opinion that the construction of the 4th nuclear plant should be delayed for at least two years, according to the legislators.

They quoted the AEC chairman as saying that before he assumed his current post, the Atomic Council had been conservative in its supervising of nuclear safety because it did not want to cause any wrong impression that the Republic of China is developing nuclear weapons. Under his chairmanship, Yen told the legislators that he personally has placed emphasis on and promoted evaluation of nuclear safety.

Study Criticizes Plans

OW311239 Taipei CNA in English 0946 GMT 31 May 86

[Text] Taipei, 31 May (CNA)--A soon-to-be-completed academic evaluation report has put a damper on the projected fourth nuclear power plant.

Yu Chung-hsien, deputy director of the Chung Hua Economic Research Institute, briefed Economics Minister Lee Ta-hai Friday on the contents of the report, which will be officially presented to him sometime next month.

The report, being prepared by a team of 48 scholars at the request of the Ministry of Economic Affairs, said the Taiwan Power Company's cost estimate of NT dollar 178.4 billion failed to take into consideration environmental costs and other attendant costs.

In other words, the cost of nuclear-generated power at the plant will be much higher than the Taipower estimate if other factors are considered.

The report also faulted Taipower's estimate of Taiwan's future power needs. It says the projection that power supplies in Taiwan will fall behind demand by the turn of the decade is unreliable because it contains too many variables.

The report also mentioned a pre-Chernobyl public opinion survey which showed that the majority of academicians and parliamentarians was against building the nuclear power plant.

The institute also conducted another poll to assess public opinion in the wake of the Soviet nuclear accident.

The government has listed the nuclear project as one of the nation's 14 key development projects to be completed in the next several years. Site preparation for the plant has already cost several billion new Taiwan dollars.

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CSO: 5100/6

CANADA

MULRONEY RAPS CHERNOBYL NEWS BLACKOUT

Ottawa THE CITIZEN in English 20 May 86 p A3

[Article by Lesly Bauer]

[Text]

Prime Minister Brian Mulroney has sharply rebuked the Soviet government for not giving out more information on the nuclear accident in the Ukraine.

And, in an unusual gesture, government leaders joined members of Canada's Ukrainian community in a rally on Parliament Hill to condemn the Soviet Union's secrecy.

In a letter to those at the rally Mulroney used some of the strongest language from the government to protest the Soviet Government's tight grip on information.

Finance Minister Michael Wilson read the message to about 1,100 Canadians with ties to Eastern Europe who came to Ottawa from as far away as London, Ont., Toronto and Montreal to protest Soviet policy.

"It is simply not good enough to offer momentary partings of the veil of secrecy which surrounds the accident and its ongoing impact," Mulroney said.

"We need to know who the casualties are, so that Canadians may come to the assistance of their friends and families. It is inhumane to impede communication between Canadians and their kin in Ukraine."

Mulroney aides were unavailable for comment on whether the prime minister's views have been conveyed directly to the Soviet government.

The demonstrators said efforts to reach relatives near the accident have been futile.

"A lot of us have tried to reach family but you get told the lines are busy or there's phone trouble. People have waited for hours on hold," said Ulana Oleksyshyn of Toronto.

Even for those lucky enough to have reached relatives by phone or letter there is a fear that a strong warning or vivid account of events as they are seen in the west may lead to trouble.

"Letters are all opened, and often don't get through. Those people (to whom the letters are mailed) may be harassed," said Lada Toptschen of Ottawa.

They also say it has been impossible to get casualty lists or locations of people who were moved because of the accident.

Dr. Robert Gale, a U.S. bone marrow specialist who returned Friday from the Soviet Union, indicated in Los Angeles that as many as 13 people have died Soviet newspapers suggest the death toll is 10.

Wilson assured the crowd the government would do everything possible to pressure the Soviet government to be more open.

Health minister Jake Epp also spoke, demanding "complete and accurate information" and vowing to "press the Soviets for full disclosure".

Besides wanting information, the demonstrators said they wanted to be able to send food and medication to those in need.

Epp was presented with packages of powdered milk and boxes bearing red crosses by several children in a symbolic appeal to let outside help reach Ukraine.

After the speeches, the crowd marched to the Soviet Embassy chanting " release information, not radiation".

At the Charlotte Street embassy they sang a funeral hymn called *Eternal Remembrance* and a song called *Ukraine is not Dead*.

Marta Nazaire, dressed in black and wearing a black veil in symbolic mourning for the victims of the accident, placed a wreath of white lillies at the door of the embassy.

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CSO: 5120/40

CANADA

RADIATION LEVELS MEASURED FOLLOWING CHERNOBYL

16 May Report

Ottawa THE CITIZEN in English 16 May 86 p E1

[Article by Cathy Campbell]

[Text] The amount of radioactive iodine found in Ottawa milk samples Wednesday was 10 times greater than in milk tested Tuesday, but still well within safe levels, says Health and Welfare Canada.

Low levels of radiation from the Soviet nuclear accident April 26 in the Ukraine have also been found in milk in Toronto and Fredericton, said department officials.

Department spokesman Carole Peacock said Thursday the level of Iodine-131 in milk samples has increased from .06 becquerels per litre in Ottawa to .5 becquerels per litre. The maximum acceptable level in milk is 10 becquerels, about 20 times above the level found in Ottawa.

In 1964, when nuclear fallout was circling the globe because of atmospheric weapons tests, the maximum concentration of Iodine-131 detected in milk was three becquerels per litre, six times higher than the latest Ottawa reading.

The standard of 10 becquerels per litre means that if a person drank two litres of the tainted milk a day for life, there would be a one-in-a-million chance of developing cancer, experts say.

Radiation from the Chernobyl accident site, which is almost 5,000 miles from Ottawa, has been detected in rain and air samples across the country, from St. John's, Nfld., to Vancouver and from Windsor to Inuvik.

A sample of rainwater from Ottawa last week showed concentrations of 60 becquerels per litre, six times the federal standard, prompting government health officials to advise Canadians not to drink rainwater.

Results from rain tested in Ottawa Thursday were to be available today.

Federal health officials are still cautioning people who depend on pure rainwater as their source of drinking water not to drink the tainted water.

Peacock said the department continues to be inundated with phone calls from pregnant women, nursing mothers and mothers of young children, who are worried about the health risk of drinking milk.

She said health officials are telling them to continue drinking milk because it poses no health problem.

While the levels of radioactive iodine found in milk have risen, tests show the concentration in air and water seems to be going down, said Peacock.

Milk samples will be tested daily in 16 places across Canada because there is some concern radiation fallout from a nuclear accident could enter cows through the grass they eat.

Testing of Canadian-grown produce has so far turned up no radiation but customs officers in Toronto have seized a shipment of French lettuce and herbs that exceeded the government's new guidelines on radiation levels in fresh produce. The new standard is 70 becquerels per kilogram.

22 May Report

Ottawa THE CITIZEN in English 22 May 86 p B1

[Article by Jane Defalco]

[Text]

Health and Welfare Canada has lifted its warning against drinking rainwater after recent tests in several cities including Ottawa showed no trace of radioactivity in rain.

"There has been a continuing trend of decreasing radioactivity contamination in air and rainwater and we expect that trend to continue," said department spokesman Carole Peacock. "That is why we have lifted the advisory against drinking rainwater."

Peacock said the government will continue to closely monitor milk, fresh produce, rain and air "until we are completely assured that the environment is free of radioactive Iodine-131."

Water from Tuesday's rain in Ottawa had no detectable radioactivity. Samples from last week's showers showed radioactivity had dropped to well within safe levels, but the warning not to drink rainwater remained in effect.

Ottawa rain on May 15 contained seven becquerels of Iodine-131 per litre, well within the maximum acceptable standard of 10 becquerels.

The previous week's samples contained 60 becquerels per litre — six times the standard. That high level prompted the warning against drinking rainwater.

Peacock said rainwater tested everywhere else in Canada since May 18 has been found to contain less than the standard of 10 becquerels per litre of Iodine-131.

Peacock added the latest air samples from Winnipeg, Toronto, Windsor and Fredericton were also free of any trace of the radioactive iodine resulting from the nuclear disaster in Chernobyl.

Harmless traces of radiation continue to be found in milk samples, while Iodine-131 concentrations have increased slightly in Vancouver and Edmonton, two cities where concentrations in rain have been the highest.

24 May Report

Toronto THE GLOBE AND MAIL in English 24 May 86 p A4

[Text]

OTTAWA·

Radioactive iodine-131 has now been found in most locations across the country where sampling is being carried out, the federal Health Department reported yesterday.

In all cases, however, the levels are low and do not pose a risk to health, the department said in a news release.

From samples taken Wednesday, iodine-131 was found in milk in Vancouver, Edmonton, Calgary, Regina, Saskatoon, Winnipeg, Thunder Bay, Windsor, Ottawa, Montreal, Moncton and Halifax. Radiation was not detected in samples from Sault Ste. Marie, Ont., Toronto, Quebec City, Sussex, N.S., and St. John's, Nfld.

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CSO: 5120/40

CANADA

WORLD ENVIRONMENT HEARING RECEIVES NUCLEAR INDUSTRY BRIEF

Ottawa THE CITIZEN in English 27 May 86 p A3

[Article by April Lindgren]

[Text]

A Canadian nuclear industry brief contending that there is excellent international co-operation on nuclear matters has drawn skeptical responses from members of the World Commission on the Environment and Development.

With the nuclear power plant accident at Chernobyl in the Ukraine fresh in their minds, some commissioners seemed surprised by the Canadian Nuclear Association brief.

The brief said that "the international co-operation which has marked the development of peaceful nuclear technology provides an excellent model" for other technologies.

It was presented by an association that represents more than 140 companies involved in the nuclear industry on the first day of public hearings by the commission in Ottawa.

Janez Stanovnick, the Yugoslav representative on the commission, reminded Canadian Nuclear Association vice-president Ian Wilson that it took the Soviet Union three days to report the Chernobyl accident to the International Atomic Energy Agency despite agency rules that require immediate notification.

Fallout from the Chernobyl accident a month ago was "so severe that the entire spring crop in my country had to be destroyed this year," Stanovnick said, noting that radiation levels on May 1 were more than 400 times normal.

Wilson said "lines of communication" were just starting to develop with the Soviets prior to the Chernobyl accident.

"Unfortunately, it wasn't fast enough," he admitted. Most of the international co-operative efforts have been confined to western nations, he said later in an interview.

The commission, which is holding two days of public hearings on environmental issues here, is conducting similar forums worldwide in preparation for a state of the environment report and recommendations to be presented to the United Nations in 1987.

The commissioners, headed by Norwegian Prime Minister Gro Harlem Brundtland, heard numerous references to the Chernobyl incident Monday.

"Chernobyl has dramatized once again that, as Marshall McLuhan said, we are living in a global village and that our only one earth compels us to share a common destiny," Brundtland said in her opening remarks.

"The tragedy of Chernobyl could have happened anywhere, and it ensures that the debate on these issues will continue in all countries."

She said the commission has asked the International Atomic Energy Agency for a report on the Chernobyl accident and its implications. The report will be part of the commission's deliberations before it delivers its own recommendations to the United Nations, she said.

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CSO: 5120/40

AECL 'BABY' NUCLEAR POWER REACTOR PROJECT CRITICIZED

Ottawa THE WEEKEND CITIZEN in English 24 May 86 p A20

[Article by Rick Boychuk]

[Text]

MONTREAL — Last year, the boys from Atomic Energy of Canada Ltd. tried to sell Mark Gordon, president of an Inuit-owned financial corporation, a nuclear reactor. A small one. Just big enough to power a village of up to 6,000, a factory, mine or hospital, or perhaps a shopping mall.

"They said it was very different technology from the big Candu (the first commercial electricity-generating reactor developed by AECL)," said Gordon, who heads Makivik Corp. which administers funds awarded to Quebec Inuit under the James Bay and Northern Quebec Agreement.

After years of design work and marketing studies, AECL has begun beating the bushes for buyers for its new reactor, the latest development in nuclear technology, which can produce electricity and hot water for heating buildings.

AECL is trying to sell the reactors now but it will take at least two years to build the first one.

Nuclear industry critics say the concept of baby nukes powering villages or hospitals or shopping malls is a nightmare.

Norm Robin of Energy Probe in Toronto who labels the idea "crazy" said: "They want to run these things unattended. If there was a failure, there is no way you could evacuate a shopping mall or hospital in time. It is one of the dumbest ideas I've heard in a long time."

Gordon Edwards, president of the Canadian Coalition for Nuclear Responsibility in Montreal, said although the AECL will assure the public that the reactors are safe, "we have had enough experience with technology that we aren't so naive as to accept these assurances."

The Inuit are not about to serve as AECL's guinea pigs, said Mark Gordon. "Let them put the first one in the south somewhere."

AECL expects considerable public opposition to the new generation of reactors called the Slowpoke Energy System. The April 26 reactor fire at the Chernobyl nuclear power plant in the Ukraine generated more skepticism about the safety of nuclear energy.

But AECL officials say their new reactor is as safe as the tiny research reactors, also called Slowpokes, that have operated at four Canadian universities since the early 1970s. The development of the new Slowpokes was based on some chilling reasoning about public opinion.

John Hilborn, the AECL research scientist who designed the original Slowpoke, noted in a paper delivered to a meeting of the Canadian Nuclear Society in 1981 that fear of nuclear accidents and radioactive contamination "may hinder the widespread use of small reactors."

Yet, Hilborn said, "It is now well known that people will accept frequent, small disasters more readily than rare catastrophes."

AECL official Metro Dmytriw said the company threw its marketing activities for the new reactor into high gear last spring after Finance Minister Michael Wilson announced the Crown corporation's research and development budget would be cut by half, to $100 million annually, by 1990.

The company immediately formed a special business unit for the new reactors.

AECL marketing people are doing a study of the energy needs of the community of Hay River in the Northwest Territories and have asked Hydro-Quebec officials whether they are interested in the village-sized reactors for energy needs in northern communities.

As well, AECL is talking seriously with China and South Korea.

The corporation is ready to commit a commercial unit any time although the prototype reactor under construction at AECL facilities in Manitoba won't be operational until September.

That's not a problem, he said, because even if a buyer stepped forward it would take about two years to do the engineering studies and construct it.

Hydro-Quebec official Roberta Brunette said the utility has not rejected the possibility of using Slowpokes in the north, but for the moment no one is actively studying the question.

According to documents obtained under the federal access-to-information law, AECL scientists believed in 1983 that the fuel would have to be replaced every two years.

Dmytriw said scientists now believe the fuel will need to be replaced every five to eight years.

Dmytriw insists the new Slowpokes will be so safe and simple to run that AECL hopes they will operate unmanned for weeks at a time. But he acknowledges the new reactors will generate radioactive gasses which will have to be vented into the air.

The Atomic Energy Control Board, which regulates the nuclear industry in Canada, has set what it considers acceptable limits for such gas venting. The venting would be done in controlled circumstances, Dmytriw said.

But Edwards said some of those gases may contain radioactive particles that would remain radioactive for years and build up in the environment. "It would be a problem that escalates over time," he said.

The reactors also would have water filters that would accumulate radioactive particles and would have to be replaced regularly, Dmytriw said. The filters, like the spent fuel and any other materials that become contaminated with radioactive particles, would be shipped in secure containers to AECL's research stations at Chalk River in Ontario or Whiteshall in Manitoba.

There, the wastes would be stored temporarily until AECL and the federal government come up with a permanent waste-disposal site. Such a facility is not expected to be in operation until the 1990s at the earliest.

Rubin and Edwards say it is folly to start selling the new Slowpokes before Canada comes to terms with nuclear-waste storage. Edwards said the Slowpokes are a desperate gambit by AECL to maintain a position in the reactor market.

But the Inuit are not interested. Hydro-Quebec has put the issue aside and anti-nuclear members of the legislative assembly in the Northwest Territories gave AECL officials a rough ride when they tried to sell the Territories government on the idea.

But the company may have a contingency plan.

Documents show that as far back as 1982, AECL and the Department of National Defence were discussing the possibility of installing a Slowpoke at Canadian Forces Station Alert on the north coast of Ellesmere Island.

Dmytriw says there have been discussions with the defence department and nothing more.

"If we can't show they are safe, then the military isn't going to want them either."

Dmytriw also says that AECL would have to jump through all sorts of regulatory hoops to install a reactor at Alert, just as it would if the company installed a reactor in southern Canada.

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CSO: 5120/40

BULGARIA

SCIENTISTS EXTOL WORK AT DUBNA NUCLEAR RESEARCH INSTITUTE

Sofia OTECHESTVO in Bulgarian 25 Mar 86 pp 16-19

[Text] On the initiative of the Soviet government, in March 1956 representatives of the charter member-countries of the Dubna Joint Nuclear Research Institute signed an agreement on its organization. Today it is one of the leading international scientific centers in the world, where joint research is conducted by scientists from Bulgaria, Vietnam, the GDR, the KPDR, Cuba, Mongolia, Poland, Romania, the Soviet Union, Hungary and Czechoslovakia. The institute's scientific program covers virtually all areas of basic research on the structure of matter. More than 350 scientific organizations from the 11 countries are participating in its implementation.

To Bulgaria, the past 3 decades have meant the following: more than 350 scientists have spent long periods of time working in Dubna (from 3 to 18 years). It also means one discovery, 26 doctoral and more than 100 candidate dissertations and more than 3,000 scientific papers published in prestigious international publications. Today Bulgarian physicists are participating in the development of 60 of the 95 scientific research problems included in the institute's problem-topic plan.

Five noted Bulgarian physicists describe the significance of this cooperation in the development of science and education in our country.

On the Front Edge of Knowledge, by Academician Khristo Khristov

Nuclear Science is at the cutting edge of the knowledge of matter and is penetrating most profoundly into the essence of processes and phenomena and the laws of the microworld. However, it is also a very expensive science, for modern apparatus and equipment used in such research are more complex than a big plant, in terms of scale, appearance and method of organization, and cost billions of leva. The only way of achieving something major in this area is for scientists and even entire countries to join efforts. It is precisely such an opportunity that the Dubna Joint Nuclear Research Institute offers to us. I was one of the members of the Bulgarian delegation at its founding, 3 decades ago. Since then, as an associate, member of the scientific council, deputy director and, for the past 15 years, representative of our country, I have maintained relations with a number of laboratories. I work as a specialist and organizer and I am convinced that this institute will exist and develop for many more years, for nuclear science has given mankind a great deal but could give even more. Nature zealously protects its secrets but our past accomplishments prove that we are on the eve of new practical, experimental and theoretical accomplishments which will create even greater interest in problems of nuclear physics.

Academician Khristo Khristov, director of the Bulgarian Academy of Sciences Institute of Nuclear Research and Nuclear Power Industry

I shall mention briefly some of the most modern trends in which work is being done in the six Dubna laboratories. (In Dubna that concept is different from ours. Actually, each one of the laboratories is a separate institute with its own problems to resolve, scientific council and personnel ranging from 500 to 1,000 people.)

The new science known as relativistic nuclear physics is currently being developed at the high-energy laboratory, in the research of which we are actively participating (Corresponding Member Professor Pavel Markov, from our nuclear institute, and Docent Velko Zayachki, from the Higher Chemical-Technological Institute in Sofia, were recently awarded the title of Discoverers, along with a group of Soviet specialists). This science deals with the processes occurring in the nucleus at energies typical of the physics of elementary particles. Studies of muon nuclear catalysis are very promising. The nuclear problems laboratory has determined that resonance conditions are created in a space between atoms 200 times smallerthan the ordinary (achieved by replacing electrons with muons), in the course of which the merger of the nuclei of deuterium and tritium and the release of corresponding energy becomes quite likely. The interest in this phenomenon has increased greatly.

The properties of new transuranic elements continu to be studied at the nuclear reaction laboratory. A Bulgarian group at the neutron physics laboratory (headed by Academician I.M. Frank, Nobel Prize winner) is working on the problem of the neutron's electric neutrality. Experimentation alone can determine whether it has any kind of charge. This problem is of exceptional theoretical or, rather, cosmic physical significance. Should it turn out that neutrons have a charge this would explain the fact noted by astronomers that the farther away a stellar association, galaxy or metagalaxy is from us, the greater the speed at which it distances itself from us. The computer and automation laboratory is developing the topical area of so-called analytical computations. Here results are provided not with individual figures but formulas which contain much more information and are applicable in a larger number of cases.

An entire school of Bulgarian specialists was trained at the theoretical physics laboratory on approaches to the theory of elementary particles and models of nuclei. Today they are doing successful work in our country in science and education.

This is merely a partial illustration of what is being done at the joint institute. Dubna is a promised land, a dream of all of our physicists. It is a center of scientific and applied research in which international cooperation and socialist integration are actually taking place.

Professor Doctor Zhelyu Zhelev, Deputy Director of the Nuclear Research and Nuclear Power Industry Institute

Experience of the Great Schools, by Professor Zhelyu Zhelev

I work in the field of nuclear spectroscopy (study of the characteristics and structure of atomic nuclei) and I shall discuss the role of the joint institute in its development. So far 110 elements are known (only 2 atoms of the last one, No 110, has been discovered!), and some 1,900-2,000 varieties, known as isotopes. Theoretically, however, the existence of about 7,000 isotopes has been predicted! The synchrocyclotron of the nuclear problems laboratory in Dubna, where the first department of nuclear spectroscopy was organized in 1959 and a strong radiochemical group for the development of various research methods was created, offers great opportunity for their discovery and their study.

In the course of these 3 decades the international collective at the laboratory has carried out an extensive program. More than 120 new isotopes and many isomers were discovered and valuable information was obtained concerning the quantum characteristics of the nuclei. Joint work done in the field of nuclear spectroscopy, in which many Bulgarians had the opportunity to participate, was exceptionally useful and yielded interesting results. Thanks to scientific cooperation with the joint institute, within a relatively short time we were able to organize in Bulgaria as well nuclear spectroscopy and radiochemistry laboratories, apply the experience acquired in Dubna and apply and perfect the methods we leaned there. As a result, during the 8th 5-Year Plan our two laboratories made an economic contribution in excess of 20,100,000 leva with total economic benefits in excess of 6.3 million leva.

A creative atmosphere and excellent microclimate are typical of the international collectives in Dubna. Personally, both as a beginning young specialist and to this day, I find it very pleasant to work with the familiar Soviet scientists Corresponding Member V. Dzhelepov, Corresponding Member V. Petrovich, Professor K. Gromov and others. Our other colleagues have also maintained long and fruitful cooperation with the creative workers at the nuclear problems laboratory. For example, a great deal of interesting research on highly excited particles has been carried out by a collective headed by Professor Doctor Emil Nadzhakov, while a group headed by Professor Doctor Nikola Balabanov, participated in studies and development of unique equipment in the area of neutron physics. For 10 years I have headed our people in Dubna and I know that Bulgarians are sought-after and desired partners in joint scientific activities.

Past experience indicates that the joint institute, this first offspring of scientific integration, played a tremendous positive role in the development of contemporary physics not only for the members of the socialist community but on a worldwide scale as well. Dubna has also become a center for upgrading the skills of many specialists from participating countries. It has had a tremendous impact on the development of our national institutes and laboratories. This prestigious name is today invariably linked with the discovery of new physical phenomena and the development of new scientific areas.

High Vocation, by Corresponding Member Professor Pavel Markov

The task of the high energy laboratory, which was among the first to be set up at the Dubna Joint Nuclear Research Institute, was to organize scientific research with the synchrophasotron, which was the biggest accelerator for its time. It was with this accelerator that for the first time a bunch of protons with a then unparalleled energy of 10 billion electron/volts was obtained in April 1957. The laboratory's director was the noted Soviet Academician V.I. Veksler. Together with a group of associates, he was awarded the Lenin Prize in 1959 for the development of this unique, complex expensive appliance.

Corresponding Member Professor Pavel Markov

I began work at Academician Veksler's laboratory immediately after the synchrophasotron was commissioned in 1957. Throughout the world, the scientific public was awaiting with tremendous interest the initial results of the study of nuclear interaction with protons at such a record-setting energy. After information was obtained on the most general characteristics of the interactions, the scientists from the member countries participating in the joint institute began to study and seek more efficient methods for the study of the phenomenon of elastic dispersal of protons. The most promising and effective was the so-called small-target method which, substantially improved subsequently, was applied in the studies conducted with the more powerful boosters which built in Serpukhov (USSR), Batavia (United States) and Geneva (Switzerland). The results of the elastic dispersal at even greater energies led to the development of theoretical research. It turned out, for example, that the dimensions of the proton thus determined increase with increases in energy. We made this discover in 1967-1968 and, after it was confirmed by other laboratories throughout the world, in 1982 we were awarded a discovery diploma by the USSR State Committee for Inventions and Discoveries.

In addition to studies involving nuclear emulsions, other groups of physicists were applying for the first time the new and more promising methods of bubble chambers. Dozens and hundreds of thousands of photographs obtained in working with them are being analyzed, measured and examined by many physicists and laboratory technicians. Special computerized and automated systems and suitably developed computer methods, algorithms, and program packets and libraries were developed to process this huge amount of experimental data. The long years of research were richly rewarded: new elementary particles and new laws of interaction among various types of particles--pions, kaons and nuclons--were discovered.

The rapid progress of contemporary microelectronics contributed exceptionally greatly to the development of so-called electronic experiments. In recent years a number of original experiments were successfully carried out with the Dubna and Serpukhov accelerators, which are designed, developed and applied by numerous international collectives of engineers and technicians, physicists and mathematicians, headed by noted and talented young and experienced Soviet scientists. The result was exceptionally valuable and interesting and important data on the mechanism of the birth and decay of a number of new strange and charm particles and new pion resonances; a number of laws on strong and weak interaction were discovered.

The scientific results achieved by the physicists at Dubna have been published in a number of articles, and reported at world, regional and national conferences, seminars and symposia on high energy physics. Every year the best scientific works have been awarded the prizes of the joint institute and USSR Lenin and State prizes.

The participation of Bulgarian scientists in the Dubna program in the area of experimental research in high-energy physics opened the way to the creation and development of a Bulgarian school. Currently some 35 members of the Institute of Nuclear Research and Nuclear Energy of the Bulgarian Academy of Sciences and the physics chairs of the VKhTI and Lenin VMEI in Sofia, the Kliment Okhridski Sofia University and the VMEI in Varna are working in this area. Working shoulder to shoulder, scientists from the Soviet Union and the other socialist countries have developed as highly skilled cadres who can resolve difficult problems in high-energy physics. Unfortunately, material facilities and, particularly, computers in our country are far from matching the needs and skills of our scientists.

We hope that the decisions of the February 1985 Plenum will provide a new powerful impetus to the development of this branch of physics in Bulgaria and that conditions will improve substantially, thus enabling us successfully to put a number of new methods to practical use.

Professor Doctor Ivan Zlatev, Head of Theoretical Physics Chair,
Kl. Okhridski Sofia University

Full Opportunities, by Professor Doctor Ivan Zlatev

I was one of the first Bulgarian specialists to be assigned to work at the Dubna Joint Nuclear Research Institute in 1957. I had already defended my candidate dissertation in Bulgaria and was teaching at the university. At that time, the condition of physics in our country was not particularly brilliant. For example, here and there something could be heard about quantum electrodynamics and the quantum theory of fields, but no one was studying such problems seriously and in depth. At that time the great Soviet mathematician and physicist Academician Nikolay Bogolyubov, today's institute director, was the director of the theoretical physics laboratory in Dubna; his deputy was Anatoliy Logunov, today an academician, deputy president of the Soviet Academy of Sciences and Moscow State University rector. They interrogated me somewhat as to what I had heard at the university and what I knew. Initially, they assigned me to study the quantum theory of fields. I studied for 3 months, after which Bogolyubov gave me my first assignment. It was "academic" (for it had no relation with the real experiment), the dispersal pi-mesons into pi-mesons. After I had provided the proof that was being sought, together with Petr Isayev, today a professor, I was assigned to make the necessary computations to test the quantum electrodynamics at small distances. My cooperation with him lasted 2 years. We published a number of scientific works.

Back in Bulgaria, as early as 1960, I began to teach a course on the quantum theory of fields. For the first time our students had the possibility to hear about a new development in this contemporary area. In 1979 I returned to Dubna for a period of 4 years, this time as institute deputy director.

The time I spent at the theoretical physics laboratory was one of the happiest times in my life. The people there were exceptionally hospitable and showed a tremendous desire to help us to enter and do serious work in the most topical areas of our science. To this day I regularly collaborate with my Dubna colleagues and visit them at least once a year to keep in touch. Happily, that institute highly values and welcomes Bulgarian scientists with pleasure. All of us have many good friends there.

In the course of these decades the Dubna Institute expanded and our cooperation broadened steadily. This is a huge and unique school for our physics, which offers the scientist a set of problems and the possibility of rapidly reaching the cutting edge of the science, surrounded by people with whom he exchanges ideas. It is the "kitchen" of scientific creativity--of all the work that stands between research and books, which is the essence of creation and cannot be found anywhere else.

In Dubna we and our colleagues in the entire socialist camp were granted a unique opportunity to do serious work on nuclear and elementary particle physics, to use modern experimental systems and unique devices. The joint institute welcomes its 30th anniversary on the eve of a new blossoming: its scientists will participate in experimentation in two unique devices which are being created: the largest accelerator in the world in Serpukhov and the so-called "meson factory" in Troitsk.

I frequently say "our" Dubna, for there we truly feel at home. We work as full members of an international collective. Our participation in the joint nuclear research institute exceptionally enhanced the experimental and theoretical level of our physics and related electronics, computers, etc. Furthermore, it confirmed the fact that enhancing the level in one area of physics entails increased opportunities in other area, for the people emulate those who are most advanced. Such cooperation has enhanced the overall standard of Bulgarian science. This applies to education as well, for today Sofia University is offering courses which are not taught in many famous universities throughout the world; let us not mention the hundreds of publications in prestigious international periodicals and the many candidate and doctoral dissertations defended on topics related to most relevant areas.

Today physics cannot develop as a "cottage industry." It must be internationally acknowledged and be of international significance. The happy opportunity for us to be full participants in the joint nuclear research institute provides us conditions for doing precisely this kind of work.

Seminar at the Theoretical Physics Laboratory. Left to right: Professor Matey Mateev, Professor Vladimir Kadishevski, Senior Scientific Associate Vladimir Mavrudiev, Docent Rustan Ibadov and Senior Scientific Associate Aleksandur Donkov

In Science and Life, by Professor Doctor Matey Mateev, Deputy Rector of Kl. Okhridski Sofia University

The Dubna Joint Institute has been for a long time and remains the only world-class scientific research center to which Bulgarian scientists have mass access. A new, until recently unknown and qualitatively broad spectrum of physical research is developing as a result of our increased number of scientists who have worked there. Gradually, the level of research and skill of scientists in this area have developed into a standard for those working in other areas of physics.

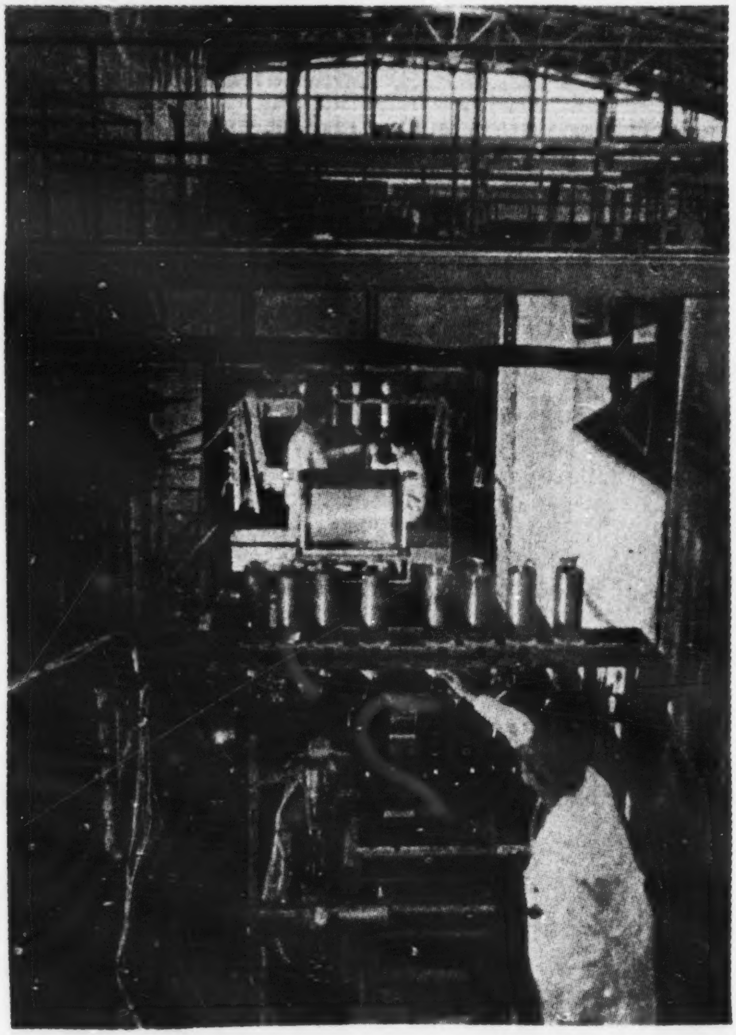
Institutes such as Dubna are particularly valuable to small countries such as Bulgaria. They make it possible with minimal capital investments for a relatively large group of scientists to work on the cutting edge of human knowledge on the structure of matter. Studies of such an extremely advanced nature have been and are sources of new demands concerning industry and technology and the foundations of future scientific and technical progress. Naturally, they also substantially contribute to enhancing the overall scientific standard in the country.

Another substantial benefit is that the flow of information can drown the contemporary scientist and merely to follow its development a person has to spend more time in a day than there are hours. Furthermore, articles published in periodicals appear from 6 months to more than 1 year after the study has been completed, and in frequent cases the information has already become hopelessly obsolete. Such is the fate of the isolated scientist: he is always behind and is frequently working on the periphery of knowledge. In a large scientific collective a person can obtain the necessary information without going to the library and, in frequent cases, before results have been published. Here one is always in step with developments in his area. Knowledge of what is important and on which other people are working simply seems to be hovering in the air and is actually obtained effortlessly. In such a collective surprises are virtually impossible and the collective is always on the cutting edge of science. Personal contacts and endless debates and discussions are the regulator which earmarks the way to future activities and optimizes decisions, from problems of scientific policy to surmounting minor difficulties in daily work.

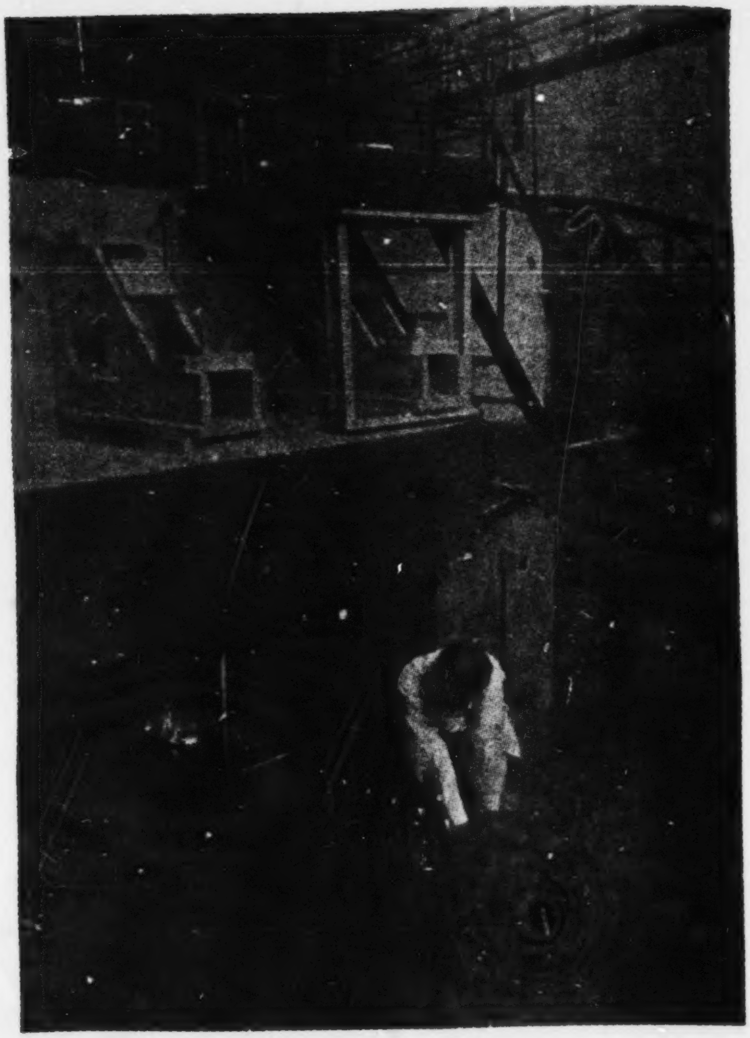
I am a member of the second generation Bulgarian scientists who have worked at Dubna. As a student and a very beginning physicist I had the opportunity to learn from our previous envoys there, in such a way that, on my arrival at Dubna in 1971, I did not find myself in an alien place and starting from zero. Thanks to the excellent attitude of the collective of the theoretical physics laboratory, where I was welcomed without reservations, both the institute and Dubna became close to me and their fate became my fate.

Within a short time my scientific outlook broadened imperceptively and incredibly. The very atmosphere at the laboratory encourages persistent work. No one comes to see you to chat or simply to kill time. Everyone is working with the ambition of creating something new, interesting and exciting. One is greatly impressed by the seriousness and high professionalism of the Soviet scientists (in most cases, actually, this is not achieved in our country): fluent knowledge of the foundations of science and profound and most thorough familiarity with all aspects of a narrow field of specialization. Professionalism runs through all levels of the joint institute, from the specialist foreman in scientific equipment to the greatest scientist. Such a collective is an ideal place for the development of a young scientist.

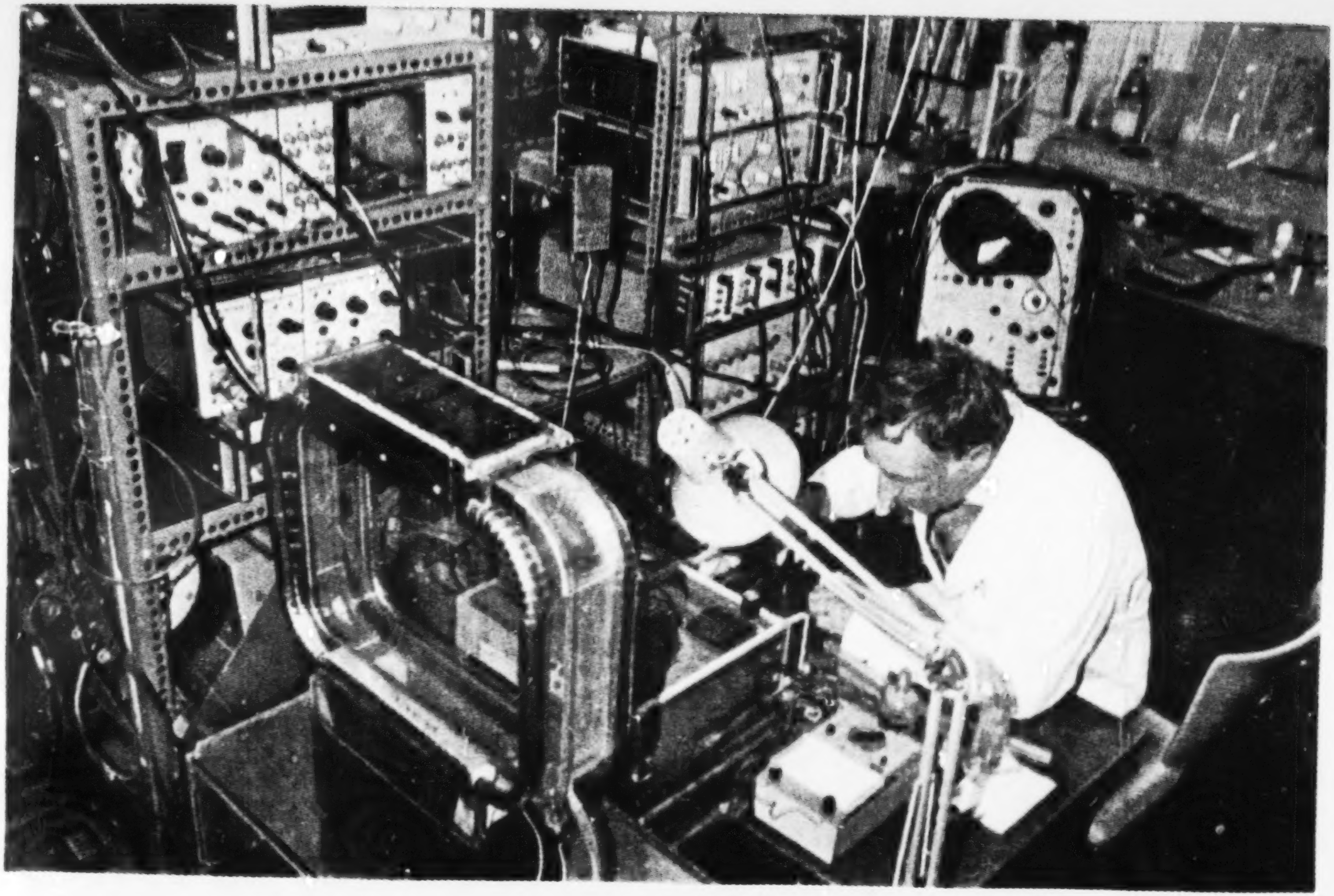
In my case, work at the laboratory was happily related to my friendship with Professor Vladimir Kadishevskiy, with whom I undertook to work. He was both my teacher in science and my closest friend. That is why everything came to me easily and imperceptively. Joint scientific creativity, which involves profound emotional experiences, demands total spiritual synchronizing and predisposition for friendship. However, frequently, somehow the ties begin to break and the scientific collective with its good feelings breaks down. Luckily this did not take place in our case: for the past 19 years we have been together in science and life.



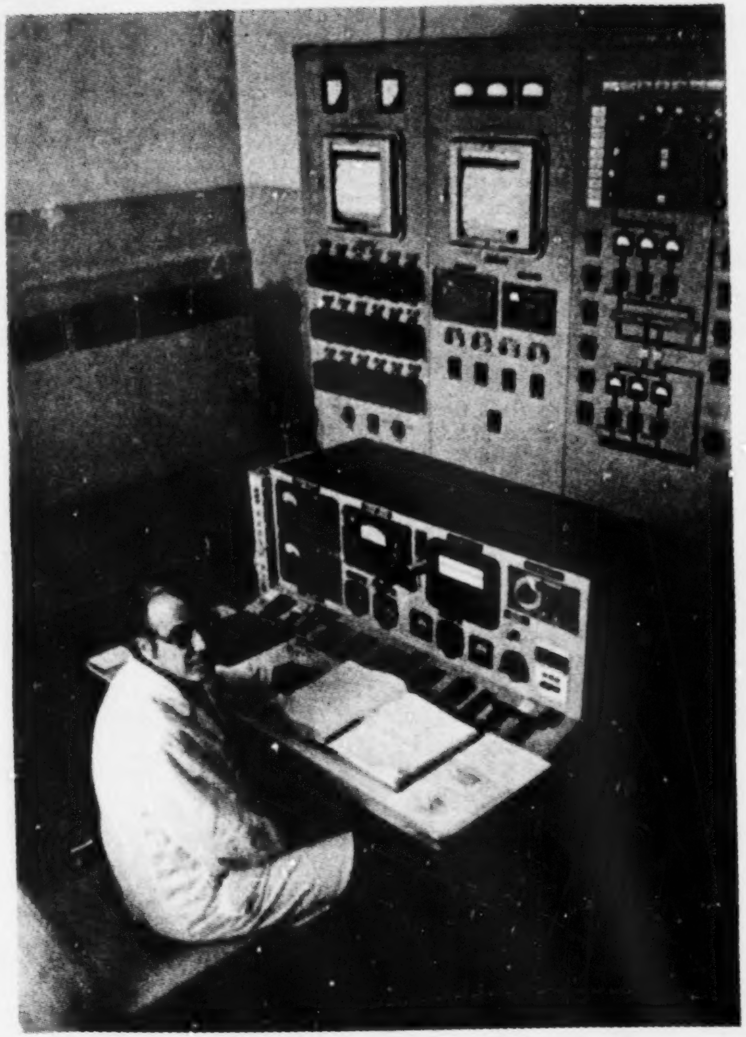
Spectrometer used in the search for charm particles



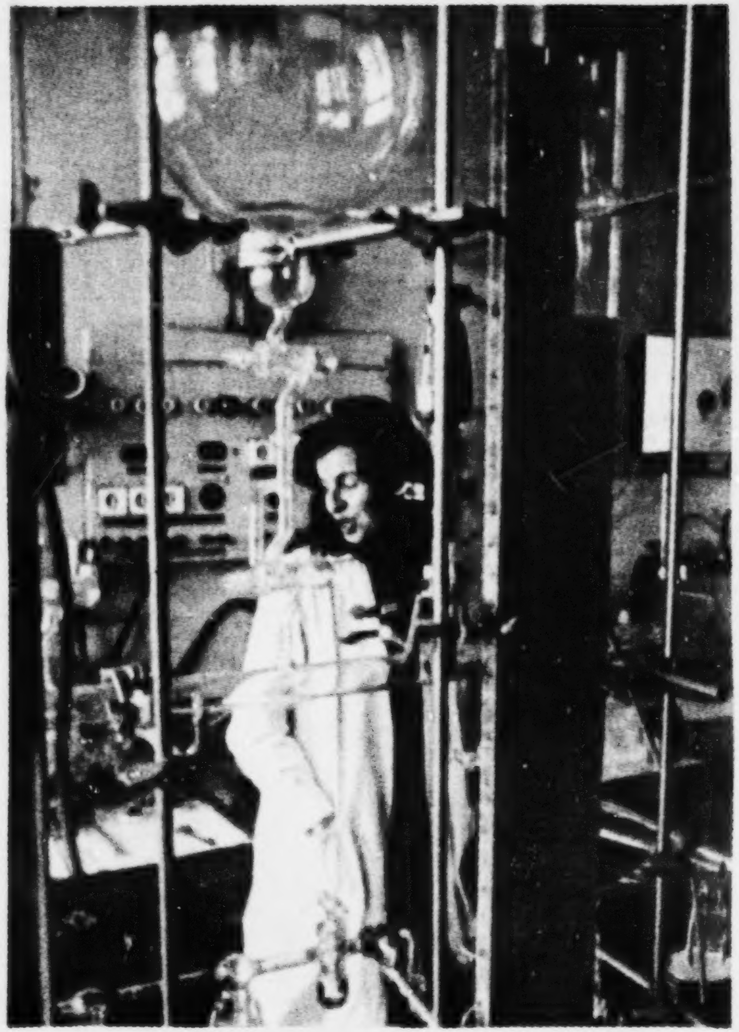
Piece of equipment used by nuclear physicists: the two-meter "Lyudmila" hydrogen bubble chamber



Institute for Nuclear Research and Power Industry, "neutron and reactor physics" sector--measuring laboratory



At the control hall of the nuclear reactor in Sofia



The Institute for Nuclear Research and Nuclear Power Industry is already engaged in radiocarbon dating

5003
CSO: 5100/3035

THEFTS OF MATERIALS AT KOZLODUY NUCLEAR UNITS REPORTED

Sofia NARODEN STRAZH in Bulgarian 30 Apr 86 pp 1,2

[Article by Stoyko Stoykov: "A Constellation on the Banks of the Danube: The Kozloduy Nuclear Power Complex"]

[Text] Among the highest structures erected by the heroic construction workers of our socialist homeland stands our national pride, the Kozloduy nuclear power complex.

In 1974 construction began on the fiery constellation of the 4 power generating units making Bulgaria one of the 19 countries in the world which use nuclear fuel for peaceful purposes. But the Bulgarian Communist Party and its central committee did not remain satisfied with the initial success, and so the Kozloduy First Nuclear Electric Power Plant, now the Nuclear Power Complex, was transformed into an impressive construction site. The first 1000-megawatt power generating units to be built outside the USSR, the 5th and 6th such units, are being assembled during the current party congress year.

Some days before May Day we interviewed one of the directors of the complex, Tsvetan Tsvetanov, director of operation and security, to learn more about the success of our personnel in the campaign to make certain of exemplary public order at the facility.

"The first 4 power generating units last year produced 13.13 billion kilowatt-hours of electric energy," he informed us, a note of pride in his voice, "and we hold first place among the CEMA member countries in volume of generating unit capacity (1,760 megawatts). Currently the efforts of our international labor collective, which in addition to Bulgarians and Russians includes Vietnamese, Poles, Hungarians, Serbs, Cubans, and Nicaraguans, are being applied toward construction of our first 1000-megawatt reactors, which have costly equipment and a large number of the latest computers. The fifth power generating unit is to be commissioned in the near future, and intensive work is in progress on the sixth unit, which should begin operation in mid-1988."

Our conversation, which is then joined by Lieutenant Colonel Vasil Lukanov, VM [Departmental Militia] commander at the complex, imperceptibly shifts to our main topic, security at the complex.

Reliable Protection

"During the current congress year, as in the past, we must not allow gross violation of public order in the operational part of the complex," pointed out the commander of the Departmental Militia, which has responsibility for guarding and securing the facility. "We have also taken the necessary steps to protect the fifth and sixth generating units. What is more, we can claim success in this area, as a result of the constantly growing sense of personal responsibility among militiamen in performing patrol and guard duty. In particular, we can claim a heightened spirit of competition among the posted guards, squads, and platoons. This spirit has been transformed into a collective guarantee of security and exemplary public order. The security alarm equipment, the pass system, and the comprehensive physical protection measures are all strictly in accordance with regulatory documents."

At this point Lieutenant Colonel Lukanov recapitulates the results of socialist competition over the 1st quarter of the year, the watchword of which was worthy commemoration of the 13th Party Congress and prompt and precise implementation of its historic resolutions.

At midnight, while on guard duty at post No 6, Sergeant Mladen Mladenov heard calls for help. An arrogant violator of public order in an inebriated condition had assaulted a helpless woman. The guard immediately went to her assistance. The malefactor tried a judo attack on him, but this did not deter the brave Komsomol member. An active member of an emergency squad, he demonstrated his high professional skill in practice and displayed respect for the assailant.

Alarms alerting to forcible entry and plundering of trucks situated in the outlying areas of the construction site were becoming more frequent. Money, expensive tools, and other property belonging to workers were disappearing. There were not enough security forces to cover the extremely large area. What could be done? This question was discussed first in the Komsomol organization and then in the primary party organization with the secretary, Valeri Nankov. A decision was made spontaneously. In honor of the 13th Congress of the BKP, each member of the militia was to serve on 13 additional details during his off-duty hours. A group of volunteers served on a detail every night to assist the duty platoon. Results were soon forthcoming. On one of the immediately following nights, when the first platoon under Captain Tomov and an auxiliary group from the third platoon under Lieutenant Barchev were on duty, an alarm was given to indicate that a truck had been broken into. Through prompt and coordinated action, the duty units succeeded in apprehending the perpetrator, a cattle breeder from the nearby village of Butan, who had perpetrated dozens of burglaries.

Late one evening, while inspecting guard posts, Senior Sergeant Kini Gornishki encountered a tractor pulling a trailer on a restricted service road. It was coming from another area, but he nevertheless decided to inspect it. He found that the trailer contained stolen pipes, boards, and other construction materials.

In the middle of one night, Senior Sergeants Marin Vulchev and Ivan Zakhariev Zakhariev decided to inspect the guard posts in the construction site area. In the northern part of the site they heard the sound of a tractor engine running. They headed in that direction, on their arrival observing two persons loading concrete reinforcing iron into a trailer. Yet another theft was prevented.

During the first three months of the year, Sergeant Tsvetan Khinovski sounded nine alarms alerting to attempts to take construction materials away from the area of the complex, thereby outstripping his superior, Senior Sergeant Dragan Dimitrov and taking first place on his shift. Senior Sergeants Valeri Vulchev, Ivan Kostovski, Luchezar Stoyanov, Petko Petkov, and dozens of other young militiamen are in leading positions in the socialist competition.

"The success of the younger and newer personnel, which has moved our second platoon into first place in the socialist competition, can be credited exclusively to the energetic work done by squad leaders Senior Sergeant Marin Vulchev, who has been given a rating of excellent by the Ministry of Internal Affairs, and Todor Shulev, and by senior personnel Stefan Kirov, Vasil Vulkov, Ivanka Dokova, and Dragan Dimitrov," stated the platoon leader, Captain Stefan Simeonov. "We have overtaken last year's first-place unit, Lieutenant Lyuben Barchev's platoon, in two of the basic categories, detection and prevention of criminal acts. The platoon commanded by Captain Emanuil Tomov is in third place."

A number of interviews with former first-place units convince us that the competitive struggle has continued from the first days of the second quarter. This is to be seen from the example and the work of younger personnel such as Senior Sergeant Zdravko Aleksandrov, Luchezar Stoyanov, Yavor Nikolov, and others, who perform their duties with a high sense of responsibility.

Our talks were accompanied, by the way, by an interesting "excursion" from the area of the active part of the complex, around the construction site and beyond, to the buildings of the fifth generating unit itself under construction. This gave us an opportunity to meet some of the militiamen posted in the most vulnerable areas where costly computer equipment is installed, the patrol guards, and some of the distinguished construction and assembly workers, such as hero of socialist labor and Dimitrov Prize winner Ivan Lichev.

"My work brigade, which has nearly 300 young people in it, has given its word that it will complete the sealed portion of the fifth reactor now under construction by the end of June," he told us. "This is an arduous task, but completing it will cut in half the time required for finishing the power generating units."

Even more exciting was our meeting with twice hero of socialist labor Gospodin Yordanov, leader of the famous Yu. Gagarin youth construction brigade and recipient of the gold Order of Labor and of the Order of the Red Banner of Labor.

"The members of my brigade are now at work at elevation mark 36 of the fifth generating unit," he says. It was necessary to install equipment of large dimensions to prepare the reactor for flushing, in advance of the 13th Congress. The work was completed ahead of schedule. The next most urgent task is to prepare the reactor for starting regular operation by the end of the year. Then we will start on assembly of the sixth generating unit."

An indelible impression of the young builders of Bulgaria in April stayed with us when we left the construction site. The intermingled sounds of Bulgarian and foreign languages in conversation continued to sound in our ears. The second new 1000-megawatt unit will soon be added to the fiery constellation of nuclear reactors on the banks of the Danube, and the flow of light, heat, and energy into our enterprises and homes will become even stronger.

6115
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CONSTRUCTION ACTIVITIES AT BELENE FACE MANPOWER SHORTAGE

Sofia TRUDOVO DELO in Bulgarian 25 Apr 86 p 1

[Article by Major Vasil Tsvetanov and Lieutenant Atanas Levchev: "The Belene Nuclear Power Plant: Construction Picks Up Speed"]

[Text] The nuclear power plant at Belene will consist of 4 power generating units. Around 1600 specialists are needed for operation of the 1000-megawatt unit alone.

At the present time, 6 construction and assembly organizations are working at the facility. Their number will soon increase to 11.

Capital investment in the amount of 2.228 billion leva will be applied during the 9th Five-Year Plan, and construction and assembly work costing 867 million leva will be carried out.

The number of construction and assembly workers must reach 15,000 by the year 1990.

Part of the construction and assembly work will be done by Construction Corps troops, which in 1986 alone will deliver 4 component facilities representing a total cost of several million leva.

As in the case of every major new construction project, many problems naturally remain to be solved. Engineer preparation of the site is 2 years behind schedule, as are also building of industrial engineering facilities and housing construction, etc. Procurement of the skilled manpower needed is another serious problem.

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CHERNOBYL INCIDENT TO PROVOKE CLOSER SCRUTINY OF PROGRAM

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 Apr 86 p 3

[Editorial: "The Nuclear Disaster in Kiev"]

[Text] If the United States were governed by a single party, which used the CIA as its "long arm" for motivating the simpletons in the Propaganda and Agitation Department (the traditional "agitprop" everyone knows about), we would now be seeing a large-scale and spirited ecological and antimilitaristic campaign directed against the Soviet Union and waged throughout the free world in order to protest against the nuclear accident in the Kiev region and demand the destruction of all nuclear arsenals on the face of the earth. Since the United States, fortunately, is a country where the parties take turns holding power and where the CIA is subordinate to Congress and does not back idiots to spearhead pro-American campaigns, the world ought to take advantage of this occasion to reflect more deeply on the problem, starting with the following question: Don't this incident and the others that occurred previously justify, in themselves, a restudy of the issue of the use of nuclear energy for both peaceful and military purposes?

It is unlikely that the true scope of the disaster caused by a failure at the Chernobyl nuclear power station--the damage to human life and to the ecology--will ever be known. Luckily for the peace of the population of neighboring countries, the radioactive clouds that reached them did not, initially, contain lethal indices of radioactivity. That fact doesn't stop speculation as to the seriousness of the accident--on the contrary, it even stimulates judgments, whether hasty or not, since the fact that radioactivity at near-alarm levels was detected in Sweden shows that something "serious" happened, to quote an advisor to Ronald Reagan.

Another aspect that attests to the extent of the calamity that profoundly affects the Russian people is the publicity given it by the Soviet government. If the disaster were small-scale, the most absolute silence would reign and Moscow would do no more than send a confidential diplomatic note to the countries affected by the radioactive clouds. Today, not only did TASS give an account of the accident--taking care to state that 2,300 had already occurred in the United States!--but it is known that an extensive area around the reactors was declared a "safety zone." Residents must have been evacuated in haste and, although it is very difficult to know how many victims there were, certainly there is a great number of them when we consider both those who suffered a lethal impact at the moment of the accident and those who will have to live for years with the prospect of genetic mutations or effects that are less serious for their progeny but perhaps more harrowing for themselves.

The nuclear industry certainly can be included in that part of the Soviet society and economy that Castoriades calls "military," that which has the most advanced technology and the best-trained and most well-paid workers. The accident at Chernobyl, even if due to human failure, certainly would not be due to inadequacies in the professional qualifications of the specialists that were running the electric power generating station. When one keeps this fact in mind and remembers other accidents, such as the one at Three Mile Island (which did not attain these proportions), one sees that the discussion about the utility of building nuclear-powered generating stations is not completely senseless. We feel completely comfortable in bringing up this controversial issue because we stand neither with those who see the atom as the greatest ill to ever befall humanity, nor with those who make defense of the environment at any price into a tool in the political struggle against the Western world in general and the United States in particular.

Actually there is no way to avoid saying that the risk that a nuclear power plant poses to neighboring population centers and even for distant regions is enormous--much greater, we would say, than that represented by a dam of the size of Aswan or Itaipu. Not only the problem of the risk posed by a disaster will become a topic of renewed discussion after the accident in the Soviet Union; the economic feasibility of the project and the damage that nuclear power plants may do to the environment will also be debated again. In normal operation, the reactors are almost as "clean" as a hydroelectric power plant, but there is a point at which they become a nightmare: how to get rid of the atomic waste? That problem has not yet been solved, despite all the efforts and the vast sums of money that Western governments and even the Soviets have allocated to it. And what can one say about what goes on in developing nations?

The Chernobyl accident does not solve the problems faced by countries of the industrialized world or developing countries that opt to produce electrical power by using nuclear energy; on the contrary, it only makes the search for solutions for those countries more distressing. The issues that will be raised from now on are of direct interest to Brazil. We are sure that the accident in the Kiev area will put the Geisel administration's nuclear plan on the agenda once again and will also raise the question or the training and technical qualifications of those who will be responsible for that plan in terms of the day-to-day operation of each plant, if and when they are actually completed. Not to forget Angra I, a striking example of the irresponsibility of an entire era of government and of imperfections that are inconceivable in a modern technological undertaking.

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BRAZIL

SARNEY ESTABLISHES WORK GROUP TO EXAMINE PLANT SAFETY

Special Attention to Angra I

Rio de Janeiro O GLOBO in Portuguese 3 May 86, p 14

[Text] Brasilia--President Jose Sarney yesterday ordered Aureliano Chaves, minister of mines and energy, to immediately set up a working group to examine safety conditions at Brazilian nuclear plants and, if necessary, to suggest measures to impreve their supervision. In his memorandum to the minister, Sarney stated that he is concerned about the accidents that have occurred at nuclear reactors in other countries.

Acting promptly yesterday, Minister Aureliano Chaves instructed the presidents of Eletrobras, Mario Bhering, and of Nuclebras, Licinio Seabra, to immediately conduct an evaluation of Brazilian nuclear power plants, especially Angra I, which is now functioning. The recommendation calls for a complete and detailed examination of safety rules observed in the construction and operation of the nuclear reactors.

Minister Chaves said that President Sarney had expressed concern about the nuclear accident at the Chernobyl reactor in the Soviet Union and its possible effects on Brazil. On that basis, Chaves asked Rex Nazare Alves, president of the National Nuclear Energy Commission (CNEN) to send him a report on the potential impact of the accident within Brazilian territory.

Chaves believes that every possible caution is already being taken in the installation of the Angra I nuclear plant, but recommends a more thorough evaluation of the situation. He said that special attention should be given to protecting the residents and the environment in the municipality of Angra dos Reis, which is located in the vicinity of the facility.

Full Disclosure Promised

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 6 May 86 p 7

[Text] Physicists Jose Goldemberg, rector of the University of Sao Paulo and Luis Pinguelli Rosa, of the Federal University of Rio de Janeiro, will be members of the special commission created by order of President Jose Sarney to evaluate the safety rules that apply to the construction and operation of nuclear reactors for the protection of the Brazilian population and environment. The commission will hold its first meeting at 10:30 am tomorrow in the office of Aureliano Chaves, minister of mines and energy.

The two physicists have been the most vocal critics of the Brazilian nuclear program. They want establishment of a policy on storage of nuclear waste and urge that construction on nuclear power plants at Angra dos Reis be stopped. One power plant--Angra I--is already operating in that Rio de Janeiro municipality and two more units are being built there--the first two under the Brazilian-West German agreement.

Other members of the special commission will be the presidents of the National Nuclear Energy Commission, Rex Nazare Alves; of Nuclebras, Licinio Seabra; of Eletrobras, Mario Bhering; and of Furnas Electrical Power, Camilo Penna; as well as the ministry's advisor for environmental affairs, Ben-Hur Batalha and representatives of Itamaraty, the National Security Council, and the Ministry of Environmental Affairs and Urban Development. "We do not want to hide anything," said Chaves, adding that his main objective is to provide the country full information.

12820/9435
CSO: 5100/2066

BRAZIL

GOVERNMENT TO MAINTAIN PROGRAM; CNEN OFFICIAL ON ANGRA SAFETY

Energy Needs Take Precedence

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 4 May 86 p 14

[Text] The Brazilian nuclear program need not undergo changes as a result of the accident at the Chernobyl atomic plant in the Soviet Union, according to a statement by Ronaldo Fabricio, director of NUCLEBRAS and president of NUCLEN-NUCLEBRAS Engineering, although he admitted that it has had a very negative effect on public opinion, and has provided opponents of the nuclear program with an opportunity to demonstrate vociferously.

Ronaldo Fabricio, however, does not take the emotional interpretation of the event seriously, and says that Soviet graphite reactors cannot be compared to Western PWR or "light water" reactors. The fundamental difference is that Soviet reactors do not have the containment tank that seals in radioactivity in case of an accident, not permitting it to escape into the atmosphere. The containment tank consists of a 3.5-centimeter layer of steel and a 60-centimeter concrete wrapping, as is the case with the Brazilian reactors.

Ronaldo Fabricio explained that little is known of what occurred in the Soviet Union, although in the Three Mile Island accident we were informed every 2 hours of the disaster's progress. Based on that information, we were able to adopt modifications that greatly improved the safety of the Angra 2 and Angra 3 reactors. He also does not accept the argument that Brazil will not actually need nuclear power until the year 2015, asserting that a nuclear plant takes from 10 to 12 years to build and that, if the basic industry is not constructed and the technical capacity not developed by the time the country's hydroelectric power is exhausted, "we will have to import those items."

He emphasized that the revisions in the nuclear program proposed by the commission appointed by President Sarney are still going to be some time in implementing, because they depend on other institutional measures. Ronaldo Fabricio agrees, however, with the commission's recommendation that NUCLEBRAS remain involved solely in the field of the fuel cycle (enrichment and mining), leaving to ELECTROBRAS the responsibility for constructing nuclear plants, and thus absorbing NUCLEN-NUCLEBRAS Engineering.

Background

The German-Brazilian nuclear program begun in 1974 by the Geisel government has already spent $7 billion, $4 billion in investments and $3 billion in financial charges. It needs $3.78 billion more to continue present work on the Angra 2 and 3 plants and the demonstration plant for the uranium enrichment process. In the event that President Sarney decides, on the commission's recommendation, to construct yet another nuclear plant, an additional $4 billion would be needed.

The absorption of sensitive fuel cycle technology that was the fundamental point of the agreement between Brazil and Germany has not taken place in these 12 years, and has forced Brazil to look for other technological alternatives in what has been called the parallel nuclear program: the development of the CTA-Aerospace Technology Center, and the IPEN in Sao Paulo.

For that reason, the commission decided to delay investment in the German enrichment process for 3 years, in order to evaluate the different enrichment processes and base a decision on eventual industrial investments on the process which shows itself to be the most promising.

The commission's report, in other words, has demonstrated that there is no reason whatsoever to justify the agreement between the two countries with regard to enrichment technology and uranium reprocessing. The discussions now are based only on the construction of nuclear reactors in anticipation of future energy demand, when the country's hydroelectric potential is exhausted.

Emergency Measures Outlined

Sao Paulo O ESTADO DE SAO PAULO in Portuguese 30 April 86 p 7

[Text] An accident like that which occurred in the Soviet Union would be impossible here in Brazil due to characteristics of Russian nuclear plants that do not provide the protection and safety conditions of the Admiral Alvaro Alberto nuclear center in Angra dos Reis, according to a statement provided yesterday in Rio by the director of the Reactors Division of the National Commission for Nuclear Energy, Jose Salvatori.

Salvatori also explained that it would be very difficult for the cloud of radioactivity from the Soviet Union to travel to Brazil, because the wind currents in the highest layers of the atmosphere in the northern hemisphere circulate independently of ours. In any case, he said that the institute of Radioprotection and Dosimetry normally makes rainwater analyses and any abnormality would be detected.

According to Salvatori, in case of an accident in the Admiral Alvaro Alberto nuclear center, the first measures would be taken by Furnas Central Electric, putting into action the emergency plan elaborated in accord with the international norms of the International Atomic Energy Agency. Those emergency plans include collaboration with the civil defense that, besides the military police and the fire departments, could also call into action the army, navy and air force, if necessary.

In case the accident cannot be immediately controlled, the emergency plan provides for evacuation of the population in the vicinity of the reactors. In order to assist people affected by radioactivity, the emergency plan would draw upon the resources of the Mambucada Hospital of Nuclear Medicine and the Marcilio Dias Naval Hospital in Rio de Janeiro, according to Jose Salvatori.

Furnas Central Electric stated yesterday that in case of an accident its responsibility covers a circle 1 kilometer in diameter around the reactor, including Praia de Itaorna and Praia Brava, where the reactors and their operators are located. Should the effects of the accident spread beyond that operational area, the SIPRON, or Nuclear Protection System, an organ of the Ministry of the Interior, would come into effect.

SIPRON is a group composed of representatives of the civil defense, the National Commission for Nuclear Energy, the navy, the army and the air force. After the population has been evacuated, transport of the wounded, in case of serious accident, and other measures are the responsibility of SIPRON, according to the Furnas report.

Furnas also explained that the Angra I nuclear plant underwent a meticulous inspection last August by AIEA technicians based in Vienna, and that the findings, extremely favorable to Furnas, affirmed that "the Angra I plant surpasses international safety standards, and currently presents minimum risk in operational conditions."

The Angra I plant underwent a reformulation of its original plans and was adapted to provide better safety conditions, as a result of an accident which occurred at a similar plant of the same Westinghouse model, in Ringhals, Sweden. All the nuclear plants of that type had to undergo repairs and modifications in the steam generation system. The Angra I plant is temporarily shut down for maintenance, recharging of fuel, and replacement of the refrigeration tubing system by a new one with a metallic connection of a titanium base, in order to prevent the salt water corrosion that has caused some problems, including small leaks, in the recent past. The other two systems, Angra II and Angra III, are still under construction, and should be ready by 1992.

The Angra II and Angra III plants are considered modern and safe by international standards. Like Angra I, the system that has been adopted is the PWR--Pressurized Water Reactor--in which the whole radioactive system, including the nucleus in which the uranium is fissioned as well as the boiling, radioactive water, is prevented from contact with the external envirnoment by means of strong steel armoring. The Angra I plant has already produced 4,397,440 megawatt-hours since it began functioning. Its capacity utilization has been 60 percent of the 626,000 nominal kilowatts. Angra II and Angra III will have twice the capacity of Angra I, or 1.2 million kilowatts.
13026/9435
CSO: 5100/2068

PHYSICIST CRITICIZES ANGRA I CIVIL DEFENSE PLAN

PY311245 Sao Paulo O ESTADO DE SAO PAULO in Portuguese 29 May 86 p 27

[Text] Nuclear physicist Luis Pinguelli Rosa, a professor at the COPPE-UFRJ [Coordination Office for Engineering Post-Graduate Programs of the Rio de Janeiro Federal University], last night said during a debate held at the Rio de Janeiro Engineering Club that it took Brazil 15 years to build the Angra I nuclear plant and that, therefore, it could wait a few more days to reconnect its reactor, "since the civil defense office lacks a civil emergency plan to safeguard the Angra dos Reis population and since the Chernobyl nuclear accident showed the need to evacuate over 90,000 people within 20 days from an area 30 km in radius."

Pinguelli Rosa showed that the Angra civil evacuation plan provided for the evacuation of people within a radius of only 15 km in 15 days. He noted that the nuclear defense system, SIPRON, was inherited from the authoritarian regime, the kind that stood by the rule: "The government has spoken, there is nothing further to add, and anyone who disagrees with this may be charged with being against the nuclear program." He added that the SIPRON program even provides for crimes against the nuclear program, but that it does not provide for the safety of the people.

Tito Alberto Gobato, an engineer at the Civil Defense Secretariat, has noted that it is not within the competence of the Civil Defense Secretariat to say whether or not the safety program is good, but that it must comply with what is established by the National Commission for Nuclear Energy, CNEN. He added: "It is absurd that until a few days ago we had an emergency and evacuation plan that was confidential and that only a few people knew of its existence."

Jose Mendoca de Lima, the person in charge of approving the Angra I plant reactors for the CNEN, also admitted that the civil emergency plan was not known by the people. Ayrton Cauby da Silva, the engineer responsible for the proper functioning of the Angra I reactor, explained that the Furnas Sao Paulo Electric Power plants company is legally responsible for any damage caused by a nuclear accident. According to Da Silve, the Furnas Company has had an emergency plan since 1980, but that this was not known by the population.

Nuclear physicist Pinguelli Rosa added that it was wrong to say that the Chernobyl nuclear plant accident was due to the inadequacy of Soviet nuclear technology and that graphite fires are very rare. He added, however, that "even the most unforeseen hypothesis can occur and the Brazilian Government has an enormous responsibility, because without the need for nuclear energy it is subjecting the Brazilian people to a tremendous risk without consulting them."

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CSO: 5100/2078

BRAZIL

BRIEFS

NUCLEAR SUBMARINE CONSTRUCTION--The minister of the Navy, Admiral Henrique Saboia, said yesterday in Rio that plans for the construction of three submarines in Brazil are perfectly viable and the NUCLEP, a subsidiary of NUCLEBRAS, will participate in the construction of the IKL 1400 class battleships, similar to the one already under construction in West Germany. The minister spoke on naval rearmament after ceremonies at the old naval headquarters, where Admiral Hugo Stoffell assumed the position of director general of materiel, receiving the title from Admiral Mario Hermes, who tomorrow will assume command of naval operations. "NUCLEP has an industrial capacity that permits participation in submarine construction, and is appropriately located to carry out this work," said the minister, who expects "to soon sign the contract with the enterprise that was recently pointed out as one of the state-owned enterprises that could be closed down." NUCLEP currently has excess capacity of above 60 percent. The first submarine of the naval rearmament is under construction in Kiel, West Germany, at HDW shipyards. The hulls of the three that will be constructed at the Navy arsenal of Rio will remain the responsibility of NUCLEP, in accordance with Minister Saboia's philosophy of not making complementary investments in the Navy for production of naval materiel when there is sufficient capacity in private industry or in the state-owned enterprises. In his speech, Adm. Mario Hermes gave special emphasis to "plans for the construction of a prototype conventional submarine, the SNAC-1, currently in the conceptual phase." [Text] [Sao Paulo O ESTADO DE SAO PAULO in Portuguese 1 May 86 p 5] 13026/9435

CSO: 5100/2068

IPEN GIVES DETAILS ON HUARANGAL NUCLEAR RESEARCH CENTER

Reactor Safety Features

Lima EL COMERCIO in Spanish 3 May 86 p A-11

[Text] The 10-thermal megawatt reactor that will begin operating next year at the Huarangal Nuclear Research Center (in Puente Piedra) will present no danger at all to the capital, the president of the IPEN [Peruvian Nuclear Energy Institute], the engineer Guillermo Florez Pinedo, assured yesterday.

At the same time he once again stated that the radioactive cloud coming from the Chernobyl nuclear power plant in the Soviet Union should not reach Peru's skies. Even if that should occur, though, it would come through the stratosphere in almost undetectable quantities, the IPEN specialists reported.

It should be pointed out that such emissions of radioactive substances would have to travel almost 15,000 kilometers through a variety of atmospheric phenomena (rain, high and low temperatures, winds, etc) before reaching Peruvian latitudes, indicated the engineer Jose Arenas Carrasco, a nuclear safety and radiological protection specialist at the IPEN.

The engineer David del Alcazar, head of the Huarangal project, reported that the Huarangal reactor's container, which is 30 meters high and 32 meters in diameter, is extremely safe. "It has been designed to withstand an earthquake of level 10 intensity; 8,000 tons of concrete and 1,700 tons of steel were used in its construction," he indicated.

The accident in the Ukraine bears no similarity to the explosion of the atom bomb in Hiroshima, according to the IPEN experts. The Hiroshima bomb was a nuclear fission reaction which released heat and produced a mechanical expansion; these factors killed hundreds of thousands of people.

Even though there is an almost total news blackout about what really happened in Kiev, it is presumed that the graphite which is part of the reactor is continuing to heat up, causing a series of fires with temperatures over 5,000 degrees C, and with a huge amount of radiation around the core.

The IPEN is remaining in constant contact with the IAEA [International Atomic Energy Agency], headquartered in Vienna, in order to obtain official reports on what is really happening, so it can evaluate the accident's magnitude, said Mr Florez Pinedo.

In closing, he indicated that winds in the northern hemisphere maintain an almost constant direction and do not travel down toward the southern hemisphere. This suggests that the radioactive cloud will not drift toward these latitudes.

Radioisotope Production in 1987

Lima EL COMERCIO in Spanish 4 May 86 p A-7

[Text] In June 1987 the Nuclear Research Center of Peru, located in Huarangal, will begin to produce radioisotopes for practical applications, primarily in the fields of food supplies and health care.

The huge 10-MW nuclear reactor is now being installed in a container 30 meters high whose structure can withstand enormous stresses, including a level 10 earthquake. That is an extremely strong earthquake which would leave all of Lima practically decimated if it should actually occur.

The Huarangal center, about 30 kilometers from Lima, has a number of specialized buildings which will be used for low-power operations. Initially, the center's main activity will be the production of radioisotopes, the president of the IPEN, engineer Guillermo Florez Pinedo, reported yesterday during a guided tour of the site.

The reactor, provided by Argentina, is 11 meters high and 4 meters in diameter. It is made of stainless steel; its center houses the core, composed of fuel rods made of uranium and other zircaloy rods which are used as moderators to cool the core.

This reactor will be used for the production of radioisotopes, for training highly specialized personnel, for nuclear technology education in various fields of science, and it will also serve as a research and experimental tool for both public and private institutions.

Ample Facilities

The auxiliary buildings include electronics labs, neutrography facilities, radiochemistry labs, reactor physics labs, experimental physics labs, activation analysis labs, reactor chemistry labs and other related labs, shops, and support systems.

Along with the reactor, the radioisotope production plant is also being built. It will have a complex of facilities for the production of radioisotopes and tracer compounds, including additional facilities for training and labs for developmental work.

The facilities of the National Radiological Protection and Medical Services Center are located in a separate building. Its activities will gradually take on a national scope, in order to protect both operators and users.

The facilities for other services are also being installed at this time. These services include: supervision and control of the use of radioactive materials, personnel dosimetry, environmental monitoring and control, radiation protection medicine and radiotoxicology, calibration of radioprotective equipment, users advice and consultation services, conventional medical services, radioactive waste management, as well as facilities for radiological protection and nuclear safety training.

In order to obtain the meteorological data needed for environmental studies, such as wind direction, speed and temperature, atmospheric moisture and pressure, a meteorological tower 10 meters high is to be installed.

This nuclear center is the result of cooperation with the Argentine government. A contract was signed between the IPEN and Argentina's National Atomic Energy Commission, as well as a financial agreement between the National Development Bank of Argentina and the Bank of the Nation of Peru.

The Staff is Ready

Engineer Florez Pinedo said that for several years the IPEN has been preparing personnel who will operate the Huarangal nuclear center.

Later, this staff may take over the future irradiation plant, which will be of great practical value in the fields of food supplies and health care.

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CSO: 5100/2071

COMMITTEE EASES STATE OF EMERGENCY

Cairo THE EGYPTIAN GAZETTE in English 23 May 86 p 2

[Text]

THE Emergency Nuclear Radiation Committee, headed by the Minister of Energy, Mr. Maher Abaza, yesterday stressed the return of natural life to Europe and all countries of the world after the disappearance of the nuclear cloud from the USSR, saying that there were no hazards of radiation either in Egypt or the Middle East.

The committee stressed that Egypt was not exposed to any nuclear radiation during the last 27 days following the explosion of the Russian nuclear reactor.

The committee also decided to permit travel to East Europe and the USSR which was prohibited during the last period, as the World Health Organisation (WHO) has informed Egypt of the possibility of travelling freely throughout the world. Threatening dagners and fears no longer exist, and exceptional measures adopted by a number of European countries, preventing travel were terminated, WHO report indicated.

The Committee also decided to stop all measures, of radio-active surveys and checks applied to planes, and ships arriving from these European countries or even passing through the local airspace or territorial waters as all examinations made to citizens or goods of the countries that were affected by radiation proved that all items and people are free from any impact of radiation.

The Minister of Energy, Mr. Maher Abaza, said that the state of emergency declared in Egypt following the Chernobyl blast will be gradually eased in Europe. He added that the committee will allow the importation of foodstuffs from Eroep provided that they will be subjected to the necessary nuclear radiation checks before being released and put for sale in markets. These food items include milk, dairy products, and fish. GSS

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CSO: 5100/4612

INDIA

LONDON PAPER SAYS INDIA SHOPPING FOR NUCLEAR DEVICES

Bombay THE TIMES OF INDIA in English 10 May 86 p 9

[Article by K. N. Malik]

[Text]

INDIA'S attempt to buy from Sweden flash discharge X-ray machines, commonly known as industrial cameras and used to inspect welds and calibrate guns, is being interpreted here as proof that India is trying to develop nuclear weapons.

"The Financial Times" reported today that since such X-ray machines were used in designing nuclear weapons, western officials — they were neither named nor their nationality mentioned — believed that India was resuming development of nuclear weapons in response to Pakistan's attempt to acquire nuclear weapons.

The report said the Indian defence ministry first asked a British firm to supply the X-ray machines which it said were not manufactured by it, but that it could supply the machines after procuring from Sweden. The British firm probed the ministry of trade and industry for a possible export licence. It was told that the licence would not be granted.

Whitehall confirmed that it blocked the sale of this particular kind of machines. It, however, did not say whether it blocked the supply of the machines because of their potential use in designing nuclear weapons or because of India's extensive defence links with the Soviet Union.

The report quoted the managing director of Scandiflash, the Swedish firm which was approached by India for the machines, as categorically denying that such machines could be used for designing nuclear weapons.

The Indian high commissioner here Dr. P. C. Alexander, said the report was baseless. The former principal secretary to the Prime Minister said the Indian government policy was clearly not to go in for nuclear weaponry. This had been enunciated on several occasions. There was no change in the policy, he added.

Where was the question of resuming nuclear weapons development, Dr. Alexander asked. India had never made or tried to develop nuclear weapons in the past. It always held that its nuclear implosion in the mid-seventies was for peaceful uses of nuclear energy.

According to reports that first appeared in "The Economist" and subsequently in "The Financial Times", scientists at Britain's atomic weapons research establishment used flash discharge x-ray machines to measure how components move and change shape during a conventional explosion which precedes the nuclear reaction. The machine can take a series of pictures through metal at extremely short intervals.

According to the report, Scandiflash has so far not supplied the machines to India. The licence, it said, was kept pending till after Sweden had clinched the £ 730 million Indian army contract for artillery announced in March.

Scandiflash had sold these machines to Pakistan in 1982. These were being used by Pakistan on the country's secret nuclear weapons project.

The report also claimed that the Indians would carry out a nuclear test within two months of Pakistan testing a bomb.

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CSO: 5150/0108

GANDHI MEETS WITH PANEL ON NUCLEAR POWER PROGRAM

Madras THE HINDU in English 10 May 86 p 6

[Text] NEW DELHI, May 9.

The Prime Minister, Mr. Rajiv Gandhi, has assured the Consultative Committee of members of Parliament attached to scientific departments that noaccident is possible at the Indian nuclear power stations as they have in-built safety features. He was speaking at a meeting of the committee last evening in the context of apprehensions created by the nuclear disaster at Chernobyl in the USSR.

To mitigate the consequences of an unlikely accident, Mr. Gandhi said a 1.6 km.-radius area around the plants had been demarcated as "exclusion area" and fenced. In addition, there was a sterilised zone beyond the exclusion area where development was controlled.

Radiation risk minimised: Members were informed that radioactivity releases from the power plant were minimised by double containment of the reactor consisting of a prestressed concrete, leak-tight reactor building enclosed in a reinforced cement concrete building. Other safety features were also explained.

They were told it was totally wrong to think nuclear power stations could explode like bombs. It was not physically possible for reactor fuel to agglomerate in a manner that could set off an uncontrolled nuclear chain reaction, they were informed.

Waste disposal: A nuclear power plant did not produce any significant quantity of radioactive waste, members were told. However, the spent fuel contained radioactive waste material and its management needed caution. Using available techniques, this was substantially reduced in volume and vitrified into a glass matrix of small volume, encapsulated in stainless steel and buried underground for long term storage. The first waste immobilisation plant had already been commissioned at Tarapur. Another at Trombay was scheduled for operation in 1990. The third plant to be set up at Kalpakkam was in the planning stage. This would have an in-built unit for handling wastes from fast breeder test reactors. It was expected to go into operation in 1993.

Members were informed that the total financial outlay for the nuclear power programme, including all activities from uranium mining to fuel fabrication, heavy water production, reactors, reprocessing and waste management was about Rs. 14,000 crores, based on the 1983 price level. The outlay for reactors alone constituted about 63 per cent, heavy water 22 per cent and other activities 15 per cent. The outlay during the 1990s would be about Rs. 1,000 crores a year.

Revenue will increase: The annual revenue from the sale of electricity with the commissioning of more stations was estimated to increase from about Rs. 1,000 crores in the mid-1990s to over Rs. 2,500 crores by the turn of the century. India's nuclear power programme was earning between Rs. 150 crores and Rs. 200 crores a year from sale of power, despite a very low tariff. The sales of ilmenite and other rare earths fetched about Rs. 11 crores a year, while isotopes earned about Rs. 2 crores. By 1993, the atomic energy programme was expected to earn more than it would spend.

The members were informed that availability of heavy water would not be a constraint on the programme. Technologies for heavy water production were now fully indigenous. There were five plants in operation. Taking into account the profile for a 10,000 MW nuclear power programme, three more were envisaged. The first of these, at Hazira, had been approved and was expected to be completed in 1991. Two more plants—one based on ammonia-hydrogen exchange and another based on hydrogen sulphide-water exchange—would be required by 1994-95.

Uranium reserves: Out of total reserves of the order of 73,000 tonnes of both 'indicated' and 'inferred' categories of uranium, about 68,000 tonnes were distributed in Singhbhum district (Bihar), and the balance in parts of Madhya Pradesh, Meghalaya and Karnataka. The Jaduguda mine was expected to continue producing uranium at the rate of 130 tonnes a year for quite some time. In addition, three more deposits had been taken up for establishment of mines and mills.

The currently known uranium reserves in the country could support a pressurised heavy water reactor (PHWR) programme of about 10,000 MW for a design life of 30 years. Even with the proven reserve of 70,000 tonnes, it was possible to attain an ultimate capacity of about 350,000 MW by the latter half of the 21st century, using heavy water reactors followed by fast breeders.

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CSO: 5150/0109

INDIA

AEC CHAIRMAN INTERVIEWED ON LESSONS OF CHERNOBYL

Madras THE HINDU in English 11 May 86 p 2

[Text] THE following is the text of the interview with Dr. Raja Ramanna, Chairman of the Atomic Energy Commission, on the Soviet nuclear disaster and its lessons.

THE HINDU: What is your reading of the fire at the Chernobyl nuclear reactor near Kiev?

Dr. Raja Ramanna: It is unfortunate that the fire had crippled the reactor. We do not have full facts about the accident. I had not seen the reactors working in Soviet Russia. From what I learnt from other colleagues, some of the reactors are accident prone, because they do not have the double containment system. By this system the radioactive releases were minimised by the prestressed concrete leak-proof reactor enclosed in a reinforced cement concrete building.

The Russians are probably cost conscious and do not want to waste money. One of the factors which compelled the Atomic Energy Commission in this country not to follow the Soviet system of not having a double containment system was to make the reactor building completely safe from any hazards.

THE HINDU: How many reactors are there in the Soviet Union?

Dr. Ramanna: About a hundred.

Q: Why did they not inform the public about the full nature of the accident?

Dr. Ramanna: It is a very difficult question to answer. Probably you know the answer. But I understand the Russians had become panicky and nervous when the accident occurred. That might be one of the factors in their delay in informing the public about it.

THE HINDU: Do the other nuclear countries have a double containment system?

Dr. Ramanna: Yes. In the United States and also in other nuclear producing countries. In the beginning, immediately after the war, some of these countries did not attach great importance to this system, more particularly so in plants which produced nuclear arms. There even if the accidents occurred, they did not see the light of day. They also did not mind if a few persons died in the process.

(He recalled that sometimes bombs had exploded while in flight like the accidents in Spain and in Ireland.)

THE HINDU: How far are our nuclear reactors safe? Have they adequate in-built safety systems?

Dr. Ramanna: Our nuclear reactors are a hundred per cent safe. They are water-to-water reactors. Unlike as in the Soviet Union where they have got graphite reactors—graphite is a very dangerous substance. They are very much old fashioned and when fire breaks out it is very difficult to put them out. As in Chernobyl, they cannot pump in water because the fire will spread by the chemical reaction. They have to pour sand and lead to insulate the reactor.

The authorities of the Atomic Energy Commission are also in constant touch with other advanced nuclear countries on the latest safety [as published] safety measures in the operation of nuclear reactors. At these meetings discussions on PRA (Protection Risk Accident) is one of the items on the agenda and they exchange notes with the information if any accident had occurred. If an accident is caused by two spare parts or five spare parts why they had taken place and what measures they should take to ward off accidents in future. PRA discussion is a must now. At times three or four international conferences take place. I will be going to Vienna in July and will come to know more about the accident at the Chernobyl nuclear reactor.

One special factor about Indian scientists is that they are proverbially cautious. They are all degree holders in engineering and highly qualified. After they are taken in the (Atomic Energy) establishments, they are given special training in handling these sophisticated units.

The same cannot be said of some of the advanced countries. Because of the shortage of manpower, they take less qualified people. That is one of the reasons why human error creeps in, causing accidents.

We feel proud that no fatal accident has taken place in any of the reactors. Now, we have given importance to automation and computers and these new facilities lessen the cause of the accidents.

One of the factors to be noticed in the atomic energy establishments is that they are located in green belt areas. Lots of trees are planted and they provide the best cover against radiation. Another practice followed is the setting up of exclusion areas. A one-mile radius around the plant area is fully protected and fenced to contain any spin-off of accidents. We also see that housing sites and other industrial areas do not come up near these units for a distance of five miles. We have followed this pattern in Tarapur, Kalpakkam and Kotah.

THE HINDU: Do the other foreign nuclear nations also follow the same principle in the location of nuclear power reactors?

Dr. Ramanna: Yes. In France it is not the case. One can find houses near nuclear power stations. In Britain and Japan people are very disciplined and they follow the Government's directive as far as possible.

THE HINDU: What measures are in force at Trombay against radiation?

Dr. Ramanna: The authorities at BARC never compromise on lowering the standards at Trombay. They strictly enforce it. Scientists and workers should be hundred per cent clear and

they constantly monitor the individuals working [words indistinct] they are given rest and allowed to resume work once they show a normal level in the absorption of radiation.

THE HINDU: Are heavy water plants free from trouble now?

Dr. Ramanna: All the plants are working well except Talcher in Orissa where they had a fire accident recently. (He complimented the fire brigade for doing an excellent job in extinguishing the flames. He regretted that labour trouble was affecting the progress of the plant).

Summing up, Dr. Ramanna said that our establishments are manned by capable hands, experienced scientists, engineers and skilled workers. The inbuilt safety measures provided in these units are "the best, comparable to any in the world".

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CSO: 5150/0110

INDIA

NUCLEAR EXPERTS SEE NO DANGER FROM CHERNOBYL

Madras THE HINDU in English 1 May 86 p 1

[Article by G. K. Reddy]

[Text]

NEW DELHI, April 30.

The Prime Minister, Mr. Rajiv Gandhi, conveyed India's sympathy to the Soviet Union over the nuclear accident at the Chernobyl power plant in the Ukraine, when the Soviet Deputy Prime Minister, Mr. I. V. Arkhipov, called on him today before returning to Moscow after attending the annual ministerial meeting of the Indo-Soviet Joint Commission.

Mr. Arkhipov who conveyed to Mr. Gandhi a personal message from the Soviet leader, Mr. Mikhail Gorbachev, could give only bare details of what exactly caused this major mishap, since he had left Moscow for Delhi before this accident.

Possible dangers: The experts of the Indian atomic energy establishment in Bombay are being consulted about the possible dangers of part of the radio-active cloud drifting towards the sub-continent through some unexpected changes in the seasonal wind direction. But those with a modicum of knowledge of the hazards of nuclear explosions, or accidental escape of radio-active gases, think that this is a very remote possibility because of the Himalayas separating Central Asia from the Indian sub-continent.

The disaster at this eight-year-old plant is reported to have been caused by a meltdown of the stricken nuclear reactor's uranium fuel core which led to a fire that burnt out of control and blew the top of the reactor, spewing radio-active debris into the atmosphere. Indian experts will study all aspects of this accident, to assess the adequacy of control systems and monitoring procedures.

From all accounts it was a major disaster since, according to the photographs of the stricken nuclear plant taken by U.S. spy satellites, the top of one of the four reactors of the 1,000 MW power station had blown off, leading to an uncontrollable emission of deadly radio-active gases which mingled with low clouds and started drifting over Europe.

Same design: There are 50 nuclear plants in operation in the Soviet Union generating nearly 30,000 MW of power with a good record of safety. About half the number of these plants are of the same design as the ill-fated one at Chernobyl. Except for one plant at Sverdlovsk in the Urals which was hampered by leakages of radio-active fluids, the rest of Soviet nuclear power plants have been operating satisfactorily except for routine maintenance problems.

But the two 500 MW nuclear power plants that India has been planning to set up with Soviet assistance are of the RBMK type at Chernobyl using enriched uranium with light water cooled graphite moderators which were considered quite safe until this accident. So the Indian atomic experts, who have been working on natural uranium and heavy water reactors, will have to re-evaluate the technical aspects and safety standards of these Soviet-designed nuclear power plants before proceeding further with this agreement.

After the nuclear blaze at the stricken plant has been controlled and the other three reactors rendered safe, the Soviet Union will probably order its own inquiry to identify the causes of this catastrophic accident. It is not unlikely that experts from other Socialist countries using the Soviet designed RBMK-type reactors for power generation would be invited to visit the site and share this information.

At that stage, an Indian team might be sent to Moscow for further discussions on the designs details of these reactors, if India is still interested in setting up the proposed two plants with Soviet assistance.

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CSO: 5150/0104

RADIATION TESTS CONDUCTED ON MOSCOW-CALCUTTA PLANE

Calcutta THE TELEGRAPH in English 13 May 86 p 4

[Text]

Calcutta, May 12: Scientists here have conducted tests on an Aeroflot plane to determine whether it was contaminated by radiation from the Chernobyl nuclear plant while it was flying from Moscow to Tashkent on its way to India.

The scientists belong to the Variable Energy Cyclotron Centre (VECC) at Salt Lake. They refused to divulge their findings, having sent their report to the Bhabha Atomic Research Centre (BARC) at Bombay. This will be forwarded to the chairman of the Atomic Energy Commission.

Officials of the Soviet airline in Calcutta said that while the aircraft must have been free of radioactive contamination when it was allowed to take off from Moscow, it may have come into contact with radioactive particles on the Moscow-Tashkent leg of the flight, which falls in the zone affected by the fallout from the Chernobyl explosion.

The radiation tests were carried out at Calcutta Airport on the instructions of the department of atomic energy of the Union government. State government officials said they did not know anything about the matter. Airport sources said instructions had been issued to conduct such tests on all flights originating from or overflying the Soviet Union and parts of northern and central Europe in which radioactivity from the Chernobyl blast had spread.

The Aeroflot plane carrying 50 passengers landed here on Thursday after a stopover in Bombay. The tests were carried out immediately afterwards by a three-member team of radiological experts from the health physics unit of the VECC, which is a unit of BARC.

Soviet officials in Calcutta have refuted the reports of radioactive contamination of the Aeroflot plane. Mr B.P. Petrunin, a vice-consul, said he had contacted the VECC scientists who had carried out the tests and had been assured that the level of radioactivity inside the aircraft had not been found to be anythng more than that normally present due to background radiation.

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CSO: 5150/0111

INDIA

ATOMIC ENERGY DEPARTMENT RELEASES ANNUAL REPORT

Bombay THE TIMES OF INDIA in English 2 May 86 p 27

[Text]

NEW DELHI (PTI): A completely indigenous nuclear robot to facilitate automation in the atomic power plants is being developed by the scientists of the Bhabha Atomic Research Centre, Bombay.

The robot, which would move around and perform operations in reactor maintenance, decontamination and decommissioning of nuclear facilities, is likely to be completed by 1990, according to the 1985-86 annual report of the department of atomic energy.

The report says BARC had also started work on development of a mobile robot and its central workshop at Trombay had successfully designed and developed a six-axis multi-purpose robot of 50 kg. capacity.

A prototype five-axis articulated robot was also designed, manufactured and tested, according to the report.

WORK ON LASER

Referring to the work on laser the report says the BARC has developed a copper vapour laser (CVL) for pumping dye laser which is capable of spectral tuning and narrowing of the output.

The report says the completion of the indigenously designed and built 100-MW research reactor 'Dhruva' at Trombay, the commissioning of the second unit of the Madras atomic power station and the achievement of the criticality by the fast breeder test reactor at Kalpakkam were the three major achievements in the Indian nuclear programme during the year.

Based on BARC-developed technology, a vitrification plant for the management of high-level radioactive wastes was commissioned at Tarapur. The scientists had also successfully commissioned a five MW 'MHD' pilot plant for more efficient electricity generation at Tiruchirapalli in March 1985.

HEAVY WATER

Referring to the 500-MW pressurised heavy water reactor, the report says a conceptual design, preparation of feasibility report, appointment of main consultant for all conventional systems and all plant structures for reference inland site had been completed.

On the heavy water production front, the department achieved significant improvements in the availability of the Baroda plant and performance of the Tuticorin plant.

The report says erection of equipment and piping is progressing at the Narora atomic power station. The erection sequence of critical equipment is being modified to minimise the delay in the project completion.

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CSO: 5150/0105

INDIA

OFFICIAL DISCUSSES CAUSE OF HEAVY WATER PLANT FIRE

Madras THE HINDU in English 3 May 86 p 1

[Text] BHUBANESWAR, May 2. The major fire which broke out in the heavy water plant of the Department of Atomic Energy at Talcher, 170 km from here, on Tuesday last, was due to "failure of one of the aluminium liners in the gasket used on the cover joint in one of the synthetic gas compressors".

Mr. K. S. Bhimbhat, Executive Director of Heavy Water Projects, said after a preliminary examination, that it has been found that the liner in the gasket used on the cover joint of the synthetic gas compressor had failed and this could be the cause of the fire. He, however, said a team of experts would be coming shortly to make a detailed study.

Mr. Bhimbhat said the engineer of the heavy water plant had done an excellent job, controlling the fire. He said the plant was operating at 290 atmospheres as against its capacity of 320 atmospheres. The supply of gas to the heavy water plant was immediately stopped and the gas in the pipeline was allowed to burn out and the fire could be brought under control in an hour.

Wind direction: The Executive Director said it was indeed fortunate that at the time of the accident, the direction of the wind was towards the control room in the northwest and not in the opposite direction and as a result, the control room was totally damaged.

Asked about the prospects of resuming production, Mr. Bhimbha, said "it will take several weeks, may be three months". Taking advantage of the shutdown, the annual maintenance and modifications in some of the important sectors would be taken up. He said that among the components which will undergo modification will be the pumps, ammonia coolers and exchangers.

Mr. Bhimbhat said the Talcher plant had not been able to have a stabilised production till November last year because of the power problem.

He hoped that the performance of the plant would improve after the modifications and the plant would stabilise.

The plant is designed to produce 62 tonnes of heavy water annually.

/9274
CSO: 5150/0106

BRIEFS

PRECAUTIONS AT NARORA--New Delhi, 8 May--Adequate precautions have been taken to guard against the danger of nuclear leakage or radiation from the Narora atomic plant, the Minister of State for Atomic Energy, Mr Shivaraj Patil, told the Rajya Sabha today. Allaying the apprehensions of members during question hour, Mr Patil said while the plants at Kota and Kalpakkam were based on indigenous technology, certain modifications incorporating the latest technology formed part of the Narora plant. Mr Suresh Kalmadi said the Narora plant was situated on the seismic belt, prome to earthquakes. Moreover, it was only 240 km from the capital. "Is there any move to shift the plant," he asked. Mr Nirmal Chatterjee cited the recent accident in a Soviet nuclear power plant. Mr Patil informed the member that the Narora plant was so constructed as to absorb earthquake shocks. Besides, it was situated in zone III of the seismic belt. All precautions had been taken, he assured the members. The plant would be commissioned on schedule. It consists of two units of 235 MW capacity each. There had been no delay in the supply of turbine by BHEL, he said. [Text] [Madras THE HINDU in English 9 May 86 p 6] /9274

KARNATAKA POWER PLANTS--Coimbatore, 7 May--Dr M. R. Srinivasan, Chairman, Nuclear Power Board, said here on Wednesday that the Centre had cleared the setting up of four nuclear power plants, two each in Karnataka and Rajasthan during the Seventh Plan period. The plants would be of 235 MW each and cost Rs. 610 crores. Mr Srinivasan who was on a brief visit here, told pressmen that there was no need for concern about the safety of nuclear power plants in India which were of a different design from that of the Soviet nuclear reactor in Chernobyl. He said the Indian nuclear power reactors had been provided with extra safety devices and any more precautions, if necessary would be taken. He said a 180-tonne transformer was being moved to Kalpakkam from Naroda to ensure uninterrupted power supply. He hinted at the possibility of setting up a nuclear power plant at Kudankulam in Tirunelveli district in the near future. [Text] [Madras THE HINDU in English 8 May 86 p 12] /9274

PROGRAM INQUIRY URGED--Kalpavriksha, a Delhi-based environmental action group, has urged voluntary organisations, lawyers, journalists and concerned citizens to campaign for a public enquiry into India's nuclear energy programme. In a statement on Friday, it noted that India had five nuclear power plants and five more were under construction. Some of the proposed nuclear plants, it pointed out, were situated in areas like Kaiga and Kakrapara where the local people were opposed to them. The statement noted that the Tarapur station, according to the Citizens Report on the State of India's Environment 1984-85 was 200 to 500 times dirtier and more expensive. Kalpavriksha has appealed to all concerned groups to write to the Prime Minister and the Chief Justice of India demanding a public enquiry into the nuclear establishments in the country. [Text] [New Delhi PATRIOT in English 3 May 86 p 3] /9274

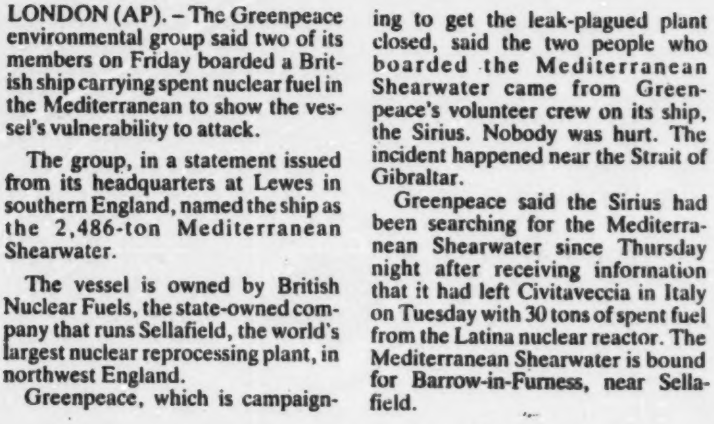
SOVIET, FRENCH OFFER--New Delhi, 30 Apr (UNI & PTI)--The Soviet Union and France have offered to set up a nuclear power plant in India, the minister of state for science and technology, Mr Shivraj Patil, told the Lok Sabha today. He said in a written answer that discussions on various aspects of the offer were on with the Soviet authorities while preliminary talks had taken place with France. [Text] [Bombay THE TIMES OF INDIA in English 1 May 86 p 16] /9274

CSO: 5150/0107

GREENPEACE DEMONSTRATES SECURITY HAZARDS

Jerusalem THE JERUSALEM POST in English 18 May 86 p 4

[Text]



LONDON (AP). – The Greenpeace environmental group said two of its members on Friday boarded a British ship carrying spent nuclear fuel in the Mediterranean to show the vessel's vulnerability to attack.

The group, in a statement issued from its headquarters at Lewes in southern England, named the ship as the 2,486-ton Mediterranean Shearwater.

The vessel is owned by British Nuclear Fuels, the state-owned company that runs Sellafield, the world's largest nuclear reprocessing plant, in northwest England.

Greenpeace, which is campaigning to get the leak-plagued plant closed, said the two people who boarded the Mediterranean Shearwater came from Greenpeace's volunteer crew on its ship, the Sirius. Nobody was hurt. The incident happened near the Strait of Gibraltar.

Greenpeace said the Sirius had been searching for the Mediterranean Shearwater since Thursday night after receiving information that it had left Civitaveccia in Italy on Tuesday with 30 tons of spent fuel from the Latina nuclear reactor. The Mediterranean Shearwater is bound for Barrow-in-Furness, near Sellafield.

/9274
CSO: 5100/4514

BRIEFS

NUCLEAR TECHNOLOGY IN AGRICULTURE--The Ghana Atomic Energy Commission is using nuclear technology to improve the quality of some selected crops and reduce post-harvest losses, Dr A. K. Ahafia, Director of the Commission, told the Ghana News Agency at Kwabenya yesterday. Dr Ahafia said the studies were supported by the international Atomic Energy based in Vienna, Austria. He said projects being carried out in the Nuclear Agriculture Department of the Commission consisted of studies to improve soil science, plant breeding and food irradiation. He said the plant breeding studies were to change, among other things, the characteristic of certain selected crops to be different from the parent stock and produce certain desired effects like increase yield, disease resistance and improved quality of the material. The studies are being undertaken in conjunction with the Universities of Science and Technology, Kumasi, the Cocoa Research Institute at Tafo and the University of Ghana, Legon. [Text] [Accra GHANAIAN TIMES in English 10 May 86 p 3] /9274

CSO: 5100/28

SEARCH FOR URANIUM DEPOSITS STEPPED UP

Lusaka ZAMBIA DAILY MAIL in English 23 May 86 p 7

[Text]

NO LARGE deposits of uranium have been found in Zambia yet by any of the five international companies involved in its exploration.

The small isolated deposits of low grade uranium identified are not viable for commercial exploitation.

However the companies are still hopeful of finding viable deposits and, together, spend over five million US dollars annually in exploration work.

This was said by the acting director of the Prescribed Minerals and Materials Commission, Mr Nick Money, when he commented on progress made by exploration firms in the hunt for uranium, a strategic mineral.

The companies involved in uranium exploration are Agip SPA of Italy, Saarberg Interplan, and Power Nuclear Fuel Development Corporation of West Germany, Cogema, and Central Electricity Generating Board. Most of these companies have been actively involved in exploration since 1980.

Exploration is done around Lake Kariba, Kariba Extension, Luangwa, Copperbelt and in the North-Western Province in Solwezi district, Kawanga and Mwombezhi areas.

Uranium exploration has been carried out intermittently for a long time but did not go into full swing until the work carried out by the Geological Survey during the 1970s. The Uranium conference of 1977 increased interest in the project.

The Uranium Act (Prescribed Minerals and Materials Commission Act) was passed in 1976 and international companies applied for licences and were granted them under agreements with the commission.

Prospecting and exploration is a continuous process, the licences are generally valid for four years of prospecting, three years of exploration and up to 25 years of mining.

Mr Money said the commission's staff position had improved and with the assistance of the Geological Survey it was now able to inspect exploration work.

Last year it was reported that the commission was unable to monitor uranium exploration work due to lack of adequate professional staff and transport.

Meanwhile, Chief Nkana of Ndola Rural has appealed to the government to grant licences to small scale miners quickly for prospecting precious gemstones, ZANA reports.

"The delays in issuing mining licences for emerald prospecting is worrying me because there are many people who have told me that they want to set up mines in my area but have not been given licences," said Senior Chief Nkana.

/9274
CSO: 5100/30

END

JPRS-TND-86-014

9 JULY 1986

Worldwide Report

NUCLEAR DEVELOPMENT
AND
PROLIFERATION

FBIS FOREIGN BROADCAST INFORMATION SERVICE

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NOTICE

The following selections from Soviet media on the aftermath of the Chernobyl Nuclear Power Plant accident and the mobilization of labor and technology in the clean-up effort will be published in the series USSR REPORT: POLITICAL AND SOCIOLOGICAL AFFAIRS under the subtitle AFTERMATH OF CHERNOBYL NUCLEAR POWER PLANT ACCIDENT. This is a representative list of the items selected for that report.

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ASIA GETS SWEDISH INSTRUMENT FOR MAKING NUCLEAR WEAPONS

Stockholm DAGENS NYHETER in Swedish 28 Apr 86 p 8

[Article by Bo G. Andersson: "FOA Warned of Nuclear Weapons Technology Sold Abroad"]

[Text] For a number of years Sweden has been exporting a measuring instrument to the third world that may be used in the production of nuclear weapons.

The instrument, a so-called flash X-ray aggregate, has been sold to countries like India and Pakistan suspected of planning industrial production of nuclear weapons. This was confirmed for DAGENS NYHETER by Defense Research Institute (FOA) sources.

At the end of the seventies the United States and other nuclear weapons powers repeatedly warned Sweden that its exportation of flash X-ray equipment could lead to the proliferation of nuclear weapons. But the Swedish government did not gain control of these sales until 1984 when the product became subject to legislation governing the exportation of nuclear technology goods.

Central Role

"The flash X-ray instrument plays a central role in the production of all nuclear weapons. Hence, there is reason to take another look at the product in discussing the risk of nuclear weapons proliferation," said Nils Gylden, head of the Defense Ministry's Security Policy Unit and one of Sweden's top nuclear weapons experts.

India, Pakistan, Taiwan, South Korea and Singapore are some of the countries that purchased flash X-ray aggregates from Sweden between 1977 and 1984.

The equipment can be used to photograph the extremely rapid course of explosions in a nuclear charge, but it also has various uses in conventional weapons research and in the civilian sector.

"It is very important to control the sale of this type of technology. Sweden must be careful not to add to the proliferation of nuclear weapons in the world through its exportation," said Gylden.

During the early sixties Gylden was engaged in nuclear weapons research for FOA in Grindsjon, south of Stockholm.

At that time he was personally involved in developing the flash X-ray technology in close cooperation with Uppsala University researchers.

Conventional

"This product was developed partly for its importance to nuclear weapons research and partly to facilitate research on various conventional weapons, such as optimizing the effectiveness of new highly explosive shells, for example," said Gylden.

Nils Robert Nilsson, an Uppsala University physics lecturer, is among the inventors of the flash X-ray instrument.

"Sweden was forced to get involved in basic nuclear weapons research in order to understand what the super powers were engaged in. This is why FOA funded the project," said Nilsson.

However, the climate changed quickly since Sweden was among the first nations to sign the so-called Nuclear Nonproliferation Treaty in 1968.

FOA definitely suspended Swedish nuclear bomb research for a few years in the early seventies. Instead, Gylden and his colleagues began to pursue the risks of nuclear weapons proliferation.

FOA Investigating

All the nations that signed the Nuclear Nonproliferation Treaty pledged to control their own production and exportation of nuclear technology in order to reduce the risk of nuclear weapons proliferation. FOA's task now became investigating individual countries' need for high-technology equipment to initiate the production of nuclear weapons.

"We established that it was not only important to regulate the trade of fission materials, reactors, etc.; even flash X-ray aggregates and other instruments would have to be controlled so as to prevent them from getting into the wrong hands," said Gylden.

In 1968 FOA sold its patent on the flash X-ray aggregate to Scanditronix, an Uppsala-based company formed by a group of Uppsala University physicists.

Scanditronix began to market the product in earnest worldwide in the mid-seventies.

At the same time, anxiety was growing within FOA that this exportation might contribute to the proliferation of nuclear weapons.

Secret Reports

Among other things, FOA's concern was based on several secret reports issued by the intelligence services of the nuclear weapons powers, according to DN sources. According to the information provided, several third world countries were anxious to purchase Scanditronix's new product with the intention of producing their own nuclear bombs. This was considered to be a leading world technology; there was only one competitor on the world market, the U.S. data giant Hewlett Packard.

"The United States strongly hinted that Scanditronix's flash X-ray equipment was getting into the wrong hands. But there is no proof that the equipment was used in the production of nuclear weapons," said an FOA source, who wished to remain anonymous.

When FOA saw how Scanditronix was continuing to market its product abroad and was successful in selling several of the aggregates, the FOA2 Department of Physics and Nuclear Technology compiled a secret report, which was sent to the National Nuclear Inspection Agency.

This was in 1979. In its report FOA recommended that the government introduce controls on the exportation of flash X-ray instruments due to the risk of proliferation.

The National Nuclear Inspection Agency immediately contacted the Ministry of Industry, and the Ministry of Foreign Affairs was also advised. Hence, by this time the government was fully informed about how Swedish nuclear weapons experts viewed the problem.

In spite of this, it took another 5 years before Scanditronix's exports became subject to legislative controls. During this period sales continued to the third world countries, among others.

The Nuclear Legislative Committee, which was appointed to review all nuclear legislation, did not even mention the issue in its report submitted during the summer of 1983.

Paid Attention

FOA, therefore, pointed out in its response to the report 15 June 1983 that there is "other equipment of great importance to the nuclear loading program, but which is not wholly or even primarily used as nuclear technology."

FOA was alluding to the flash X-ray equipment. The government paid attention and regulated the exportation through legislation governing nuclear technology goods, which took effect in April 1984.

Scanditronix now has to get government approval to export all aggregates over 500 kilovolts.

Equipment Not Used for Nuclear Weapons

"Our flash X-ray equipment does not contribute to a greater proliferation of nuclear weapons in the world. What FOA and others are saying can be qualified as nonsense."

This statement was made by the management of Scanditronix Inc., an Uppsala-based company, whose exportation of flash X-ray equipment has been severely hampered by the new legislation governing nuclear technology goods.

"The flash X-ray equipment we produce is a low-voltage instrument, 1,200 kilovolts at the most. Such instruments are not used in the production of nuclear weapons and there is no risk of our contributing to the proliferation of nuclear weapons," said Arne Mattsson, deputy director of Scandiflash, a Scanditronix subsidiary.

Follow-Up Service

"Nuclear weapons powers use flash X-ray equipment of between 8,000 and 30,000 kilovolts in their production of nuclear weapons. We have never made that powerful an instrument," said Mattsson.

According to Mattsson, Scandiflash has sold flash X-ray aggregates to some 20 countries throughout the world. He confirmed that this included India and Pakistan.

"Our instruments are only used for research in connection with conventional weapons systems. We know exactly where and how India and Pakistan are using this equipment because we have been responsible for follow-up service on the equipment for a long time."

Mattsson is very displeased with the new legislation on nuclear technology goods, in which flash X-ray equipment is explicitly described as a "risk product" from a nuclear-weapons proliferation point of view. Regulations state that the company must get government approval before exporting any aggregate over 500 kilovolts.

"This legislation is the result of pressure on the Swedish government from the United States in particular. In spite of the fact that this is a completely Swedish product, the United States wants to halt all exportation for strategic reasons. This is part of its embargo policy with respect to the Eastern block," he said.

Scandiflash exports approximately 15 to 20 instruments per year. Last year the company recorded sales of 8 million kronor. Since the export control legislation was enacted in 1984, the company has applied for an export permit four times. The government has approved exportation of the equipment to Bulgaria, Italy and England.

Disagreement About Voltage

In the production of nuclear weapons the flash X-ray equipment is used to study the extremely rapid ten-thousands of a second course during which the plutonium is being compressed in the loading chamber and a series of flash electrons are being initiated. With the aid of this instrument, one can learn what is necessary in terms of conventional explosives which encircle the fission elements.

The instrument consists of a high-voltage generator and an X-ray tube and is quite simply an ultra high-speed camera. The higher the voltage, the faster the event is registered on the film.

The flash X-ray instrument is also used to study the explosive effect of projectiles. Sheet-metal requirements for the S tank were developed in this manner.

Scandiflash flash X-ray instruments have almost exclusively been used for military purposes. However, two of the instruments sold are being used for civilian purposes, to study driver reactions to collisions in which the body is suddenly thrust forward.

Nuclear weapons experts differ on the voltage necessary to use the instrument in connection with nuclear weapons. Anders Froman, the leading FOA expert in the field, does not even exclude equipment under 500 kilovolts (freely exported) for this purpose. "Of course, its effectiveness is reduced, but it would still be of interest to a country that cannot obtain a higher-voltage aggregate," he said.

8952/9435
CSO: 5100/2521

CHERNOBYL ACCIDENT SPARKS CONCERN OVER DAYA BAY

Independent Study Urged

Hong Kong SOUTH CHINA MORNING POST in English 9 May 86 p 14

[Text]

The Government should set up an independent investigation body to scrutinise all research reports on the Daya Bay nuclear plant, a coalition of environmental groups said yesterday.

The body, which should include representatives from the public, could re-examine health and safety risks, effects on environmental conservation and likely economic gains, to decide if construction of the plant should go ahead, the groups said.

The Committee of Concern for Nuclear Energy said major research reports on the plant had never been made public.

Financial Secretary Sir John Bremridge said in the Legislative Council meeting on Wednesday that one of five Government-commissioned studies, undertaken by the UK Atomic Energy Authority on the probability of accidents at the nuclear power station and the consequences for Hongkong, had yet to be completed.

A member of the committee, Mr Fung Chi-wood, said the Daya Bay project should be frozen pending the completion of the study.

He also asked if the Government had a contingency plan, in case of disaster, to evacuate the more than one million Hongkong people who now live within an emergency evacuation zone.

Mr Fung also claimed that the nuclear reaction processes for generating electricity at the Daya Bay plant and the Chernobyl plant in Russia were the same.

The protection shield may not able to resist the enormous pressure from the plant's core during a meltdown, he said.

Mr Fung added the group would put its case to Umelco next week, and to back it with a petition campaign and a forum to discuss the Daya Bay plans.

Appeal Conveyed to Beijing

Hong Kong HONGKONG STANDARD in English 16 May 86 p 5

[Text]

A GROUP of local intellectuals yesterday published a full-page advertisement in a Chinese economic newspaper to voice their anti-nuclear views.

The advertisement was published in response to the recent spate of nuclear accidents around the world. It cost about $10,000, including typesetting and publication.

The cost will be borne by 167 supporters, who jointly signed the statement.

One of the organisers, a social science lecturer in Hongkong Lingnan College, Dr Stephen Lau, said the group believed it was time they expressed their views on the global issue.

"We rushed to organise (the voicing of the views) within a week and we are satisfied that more than 100 people supported us, in view of the short notice," Dr Lau said.

The supporters include lecturers from University of Hongkong and Chinese University such as Mr Yeung Sum and Dr Lam Man-ping and Dr Stephen Tang, and lecturers and teachers of post-secondary colleges and secondary schools.

In the gently-worded advertisement, supporters urged the Government to publish details and safety assessment reports of the Daya Bay plant.

Earlier, the Government gave its assurance that everything about the plant would be made "transparent."

Dr Lau said the demands were made because many doubts regarding the nuclear plant had not been cleared.

The advertisers said the plant should not be operated unless it has the support of Hongkong residents, who will have to suffer should any mishap occur at the plant.

They also appealed to the Chinese authorities to review the policy of nuclear power development.

"The moderate manner that we used to express our demands is the general attitude of intellectuals in handling issues," Dr Lau explained.

"We hope to arouse public attention on the nuclear plant issue and we also hope the local Government will respect public opinions by disclosing more information on the subject," he said.

Dr Lau is confident that the local branch of *Xinhua* news agency will convey their appeal to the Chinese Government.

The group plans to publish the advertisement again in about two weeks' time, he said.

One of the supporters, Mr Yeung Sum, said he hoped the advertisement would help to drive home the message that there is a need to have an open government which is accountable to the public.

"The concern of local residents focused on economic and political issues in the past. Now they should try to pay more attention to environmental safety."

Environmental Panel's Role

Hong Kong HONGKONG STANDARD in English 24 May 86 p 2

[Text]

A FORMER member of the Environmental Protection Advisory Committee (EPCOM), says Epcom should discuss the proposed Daya Bay nuclear power plant, to be built in China, just north of Hongkong by 1992.

Mr Henry Litton, QC, who was taken off Epcom in 1984, has written letters recently saying that in the past, attempts by Epcom members to discuss Daya Bay "have been frustrated on the grounds that it was outside EPCOM's terms of reference."

After the Chernobyl nuclear accident, the Financial Secretary, Sir John Bremridge, pledged an end to secrecy surrounding Daya Bay, and Mr Litton says no one should be appointed to Epcom without an assurance that Daya Bay will be included in its terms of reference.

In response to Mr Litton's suggestions, Mr John Chambers, Secretary for Health and Welfare, said it is not taboo to discuss Daya Bay during Epcom meetings.

"Epcom has been briefed in the past about Daya Bay," said Mr Chambers. "There is no reason not to give more information if that is what they want.

If Epcom is looking at health problems, and "different types of pollution," Mr Chambers questioned whether the committee should discuss Daya Bay, which has not been built yet.

"Epcom is supposed to look at certain problems and Daya Bay is not something that falls within the scope of Epcom," he said. "But, it is also up to Epcom to say what it wants to discuss. There has been no request for the committee to discuss it further. That should be raised by the chairman."

But Epcom chairman Mr Gerry Forsgate said Epcom "has a lot on its plate" discussing air, water and noise pollution, and he would like to see a committee of experts established to discuss Daya Bay.

"God knows we have enough (environmental) problems in Hongkong. We don't have the expertise or the technology of radiation. It should be referred to a special committee.

"Discussing nuclear problems and radiation problems requires the attention of high-powered people on a special committee," he said.

Information to Public

Hong Kong SOUTH CHINA MORNING POST in English 25 May 86 p 3

[Text] BOTH the Government and operators of the Daya Bay plant are looking at ways to speed up their campaign to help educate the public about nuclear power.

The Government was close to completing its campaign, intended to start three or four years before Daya Bay goes into operation in 1992, when the Chernobyl disaster occurred on April 28.

The campaign timetable has been thrown forward under a shower of public questioning since Chernobyl.

The Guangdong Nuclear Joint Venture Company (JVC) also is looking at what measures it can take to provide information on the Daya Bay project.

An engineer from JVC said by telephone yesterday the company may produce a brochure covering a wide range of aspects, including building specifications.

Only 10 days before the Chernobyl disaster, members of the Government's Economic Services Branch, the Royal Observatory, the Medical and Health Department, Education Department and Government Information Service discussed possible strategy.

The plans were based on advice from the Atomic Energy Agency (AEA) of Britain which the Government engaged in November.

"We now have to revise our timetable – people want more information and they should be given it," said Mr Canice Mak, principal assistant secretary of the Economic Services Branch.

Mr Mak is also a member of the working group looking at the safety and enviromental aspects of Daya Bay.

The group is discussing whether or not it is necessary to ask an AEA expert to visit Hongkong.

Soviet Errors To Be Avoided

Hong Kong SOUTH CHINA MORNING POST in English 9 May 86 p 2

[Editorial]

[Text]

In his lengthy reply to the Legislative Council on the safety measures against a possible radiation leak from the Daya Bay nuclear plant, Sir John Bremridge made trenchant criticisms of Soviet Russia's excessive secrecy and incompetence over the Chernobyl meltdown.

It is a factor which deserves to be emphasised, not to rub salt in Russia's grievous nuclear wound, but for the sake of all who will be involved in administering the Daya Bay plant.

What must be the first concern of all who run such projects is the well-being, safety and protection of nearby communities. Whether these are Russian, Chinese or Hongkong people is immaterial.

The Soviet Government and its media are now beginning to admit that the dimensions of the Chernobyl disaster were very much more serious than at first indicated, that people were panic-stricken, that thousands were belatedly evacuated and that there was widespread concern and anxiety among the populace, with queues outside railway stations and airline booking offices.

It would be surprising indeed if the Russians were able to suppress instincts common to all humanity. If people living in the West who are exposed much more to the arguments of articulate pressure groups and the counter arguments of nuclear protagonists can be concerned at the danger they face, how much more so in a closed community where there is greater ignorance and fear of the unknown.

What happened, however, should be an object lesson not just to the Russians and the East Europeans on how fear of exposure can blind a few misguided people to their obligations to humanity, but to all communities obsessed by the quest for watertight security.

As far as the Daya Bay project is concerned, Hongkong is as much concerned about structural weaknesses, material faults and chemical reactions as human error. Perhaps the last is the greatest danger, as Chernobyl revealed. For the most efficient warning systems are useless if those in charge refuse to heed them and take immediate and decisive action.

Those who tried to conceal the disaster at Chernobyl were guilty of criminal negligence of the highest order, for in foolishly trying to suppress the extent of the disaster they not only exposed their own people, neighbours and families, but discredited their own Government which had to be told by monitoring stations 1,000 kilometres away and by spy satellite pictures received in the United States the true nature of the disaster.

Is there any way Hongkong can be assured that this will not happen at Daya Bay? For while it may take time to evaluate the degree of any mishap, it is far better that precautions against contamination or fallout are taken immediately – even if in the event it is seen as premature and an overreaction. Better that lives are saved than jeopardised to save an official's face.

What Hongkong must ask is for the duplication of all automatic monitoring systems in both our own territory as well as in the Daya Bay plant, so that independent conclusions can be drawn and that we do not have to wait for a tardy finger to reach for the red button after hours of futile indecision.

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CSO: 5150/0118

DANGERS FROM NUCLEAR SHIPS, WEAPONS IN HONG KONG WATERS

Hong Kong SUNDAY STANDARD in English 25 May 86 p 4

[Article by Tim Hamlett, Stephen Morgan, Annie Lam, and Ivan Lo]

[Text]

WHILE there has been mounting public concern about the possibility of a nuclear power station in Daya Bay, there has been little awareness of the passage through Hongkong of several nuclear reactors a year and an undisclosed number of atomic bombs.

This floating nuclear armoury comes to Hongkong by courtesy of the US Navy, which uses the port as a rest and recreation stop.

Something like one percent of Hongkong's tourist industry income is provided by visiting US sailors, who made 99,000 visits last year (including repeat visits).

Last year's visiting fleet, which ranged from tugs and training ships to nuclear submarines and a (conventionally powered) aircraft carrier, numbered 63 ships, again including a few repeaters.

Quite how many of these vessels carried nuclear weapons is a delicate topic.

Nuclear propulsion is harder to hide. We can state with complete confidence that six of last year's visiting vessels contained functioning nuclear reactors.

They were nuclear-powered hunter-killer submarines.

The US government refuses as a point of principle to say which of its ships visiting foreign ports carry nuclear weapons, on the grounds that such information would be useful to an enemy.

This refusal has resulted in the cancellation of plans for port visits to Shanghai, a full-scale row with New Zealand, and occasional strained relationships with Japan.

The official justification offered seems slender. The naval tight lips may have more to do with preserving the polite fiction that US ships never carry nuclear weapons in Japanese waters.

Seekers after information in this misty area are actually quite well catered for by the published material.

The estimates which follow are based on information provided in *Jane's Fighting Ships*, *Jane's All the world's Aircraft*, and *The Military Balance*, an annual summary of the world's armed forces published by the International Institute for Strategic Studies in London.

Of last year's 63 visits, 34 were by vessels on which it would be surprising to find nuclear weapons, and which are not fitted with equipment to launch or fire them.

These ships are tugs, amphibious warfare vessels of various kinds, training ships, survey ships, supply tenders and so forth.

The remaining 29 more belligerent boats include six which appear from published material to carry no equipment or armament involving nuclear weapons, and one of which we remain unsure.

That leaves 22 visits from vessels which are equipped to fire nuclear devices, either as bombs, missiles, torpedoes or depth charges.

Five of the six nuclear-powered submarines are fitted with the SUBROC homing torpedo system, which is only available with a nuclear tip.

Most of these submarines are also being fitted with Cruise missiles, launched vertically from a silo in the deck. One of last year's visitors had already been equipped in this way.

Last year's aircraft carrier was not nuclear-powered (she is based in Japan). However, like all US main battle carriers she flies a bombing wing of 34 aircraft.

Depending on the type of aircraft on the carrier concerned, these bombers will be fitted to carry from two to four nuclear bombs each.

Such carriers also have a squadron of helicopters capable of dropping the *S-3* nuclear depth-charge on hostile submarines.

Bearing in mind that the outbreak of a nuclear war is unlikely to permit wholesale rearming of distant carriers, it seems likely that such a vessel will carry some 50 nuclear devices, and those flying the *A-7* bomber will require rather more to mount just one fully armed nuclear attack.

Two of the six carriers usually stationed in the Pacific have nuclear propulsion. The *Enterprise* has eight reactors, the *Carl Vinson* only two.

Guided missile cruisers, of which one visited us last year, are armed with the Standard surface-to-air missile, and also with a device called *ASROC*, which is a sort of rocket-propelled depth-charge.

Both these weapons are capable of carrying a nuclear or conventional warhead, according to need.

The *ASROC* system is also found on most destroyers and frigates. Eight tubes are the standard fitting.

Some destroyers are also being fitted with the *Tomahawk* cruise missile — a naval version of the weapon causing so much controversy in Europe.

Two of last year's visitors are said to carry four of these missiles each.

The published information is not very helpful on the extent to which nuclear warheads are expected to be used in practice.

A list compiled in Washington using the previous year's *Jane's* and *Nuclear Weapons Databook* (an unofficial publication) included all our nuclear "suspects" as carrying nuclear weapons.

It appears that the amount of nuclear material passing through Hongkong in US Navy ships is going to increase (at least until 1997).

The present policy is to give the Atlantic Fleet the lion's share of the new equipment, so that current programmes to upgrade the Fleet have been slow to produce new specimens of naval armament in Hongkong.

More guided missile cruisers can be expected than last year's solitary visitor as the US Navy approaches its target of having two of these vessels to escort each carrier or battleship.

Current plans call for an increasing reliance on nuclear carriers, and a complete phasing out of "conventional" submarines.

Further deployment of cruise missiles on small ships like destroyers and frigates is also part of current naval strategy.

What does all this mean for Hongkong, apart from making it a tempting nuclear target in the Third World War?

The combined effect of visits from nuclear powered ships is that, for about a month of every year, there is at least one functioning nuclear reactor floating in the harbour.

American ship-borne reactors require a constant flow of sea-water as a coolant. No serious radiation leaks from this source have been reported, but this may owe something to military reticence.

The safety record of civilian nuclear-powered ships was bad.

Bombs, missiles, and depth charges are carefully designed to avoid accidental explosions. There is no record of such an accident.

Even in a case where a bomber jettisoned its load over southern Spain there was no nuclear explosion (though contamination was a problem).

Still, even the best-run navies occasionally suffer from collisions, accidental groundings, fires on board and submarines which refuse to surface.

The US Navy's intermittent presence in Hongkong waters implies some risk of an accident of this kind, complicated by the presence of nuclear material, either as a propellant or an explosive.

The worst conceivable case would probably be a collision involving a nuclear-powered submarine which subsequently sank.

Measures would then be needed to retrieve two different kinds of nuclear weapon, and to make the submerged reactor safe.

This would require an unusual combination of skills which would probably have to be supplied by the US Navy itself.

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CSO: 5150/0119

DIET APPROVES NUCLEAR ENERGY ACCORD WITH PRC

OW210313 Tokyo KYODO in English 0259 GMT 21 May 86

[Text] Tokyo, May 21 KYODO--The Diet Wednesday approved a Japan-China agreement to provide Japanese cooperation to China's peaceful use of nuclear power. In an upper house plenary session, the Liberal-Democratic, Komeito, and Democratic Socialist Parties voted for the agreement. The measure had already been passed by the lower house.

Under the agreement, Japan will cooperate with China to research and application of radioactive isotopes and design, construction, and operation of nuclear reactors and disposal of radioactive waste. The agreement also prohibits China from diverting nuclear substances exported by Japan to China to development and production of nuclear arms.

The agreement was signed between Japanese Foreign Minister Shintaro Abe and his Chinese counterpart Wu Xueqian at the fourth Japan-China ministerial meeting last July. The Japan Socialist Party opposed the agreement in both lower and upper houses in light of the Chernobyl nuclear accident in the Soviet Union in late April.

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CSO: 5160/066

PRC OFFICIAL DISCUSSES CHERNOBYL, DEVELOPMENT OF NUCLEAR INDUSTRY

HK281145 Hong Kong LIAOWANG OVERSEAS EDITION in Chinese No 21 26 May 86 pp 4-5

[Article by Zhang Chunting: "The Nuclear Accident in the Soviet Union and the Nuclear Power Development Plan in China--Zhou Ping, the Deputy Head of the Leading Group for Nuclear Power Plants Under the State Council, Answers Questions Raised by a LIAOWANG Reporter"]

[Text] The Soviet Union's Chernobyl accident in the Ukraine in late April caused a worldwide shock with ongoing repercussions. This reporter recently interviewed Zhou Ping, deputy head of the PRC State Council's Nuclear Power Leading Group and vice minister of the nuclear industry regarding the Chernobyl disaster.

The 54-year-old Zhou Ping returned to China in 1958 after completion of his study abroad. Since them, he has been engaged in physical calculations and experimentation regarding nuclear reactors, as well as in the design, regulation and operation of reactors. He is a senior engineer and specialist of the PRC Ministry of Nuclear Industry, vice chairman of the PRC Nuclear Academic Society Council, and a council member of an international atomic energy body.

How Should We View the Soviet Union's Nuclear Disaster?

This reporter asked Vice Minister Zhou Ping: In your opinion, how should we view the Soviet Union's recent nuclear accident?

Zhou Ping said: The Soviet Union's recent nuclear accident was as unexpected as disastrous. Just as Dr Hans Blix, director of the International Atomic Energy Authority pointed out on 9 May: "This has been the most disastrous nuclear accident to date in the world, because the radioactive material leaked in this accident is greater in volume and far more serious than any other major accidents in the past." The meltdown of the uranium fuel rods was serious enough, and the radioactive material leaked in great volume has demonstrated that the accident was extremely grave. We have not yet read any formal report on the primary cause that led to the accident. According to the Soviet Union's initial report, some chemical explosion had damaged the water-circulation system and ignited fuel rods and graphite bricks which gradually led to a major accident.

Here we should point out emphatically that the pressurized graphite tube slow boiling-water reactor adopted by the Chernobyl power plant was an early model, which was entirely different from the pressurized-water reactor adopted by most countries in nuclear power plants. Based on analysis, the Chernobyl reactor was not equipped with an enclosed safety container, and its emergency water circulation system was neither complete nor perfect. Therefore, once the accident took place, radioactive gas soon spread to the atmosphere. More than 10 casualties have been reported to date in the disaster. No matter what the causes were, it was a bitter incident in the human history of nuclear power development. The unfortunate casualties among those nuclear power workers are heartbreaking. This disaster will serve as a grave lesson to people throughout the world.

Will the Soviet Union's Nuclear Accident Affect the Implementation of China's Plan for Nuclear Power Development?

This reporter asked: Will the Soviet Union nuclear accident affect the implementation of China's plan for nuclear power development?

Zhou Ping is an expert in nuclear reactor projects and is one of the chief responsible persons in the country's nuclear power industry. He smiled and said: "No. It will by no means change our determination to develop nuclear power." According to Zhou Ping, nuclear power is a new type of energy resource. It has already developed into an important resource of energy despite its short history of just over three decades. According to the statistics of one international atomic energy group, the total generated energy volume of nuclear power plants in 26 countries including the United States, France, the Soviet Union, Japan, the FRG, the United Kingdom, Canada, and Sweden accounted for 15 percent of the total world volume of generated energy by the end of 1985. It is estimated that by the year 2000, the volume of generated nuclear power energy will account for 40 percent of the total world volume of generated energy.

Insufficient energy supply in China has affected the national economic development, therefore the development of the nuclear power industry is a must. Such regions as East China, South China, and the Northeast, where there are great shortages of energy resources, especially need to develop nuclear power stations. Therefore, China's nuclear power industry, which is still in its initial stage, must be developed resolutely, step by step, with some focal points. This is China's set principle, which will not change just because of the Soviet Union's Chernobyl accident. By the year 2000, China's nuclear power industry will certainly have made great progress. Before making the important strategic decision to develop the nuclear power industry, China made overall and detailed investigations and studies, as well as analyses and comparisons of all types of nuclear reactors abroad. The final decision was to adopt the pressurized-water reactor, which is technically mature and has better safety quality. Moreover, from the very beginning China has persisted in cooperating with those countries possessing advanced technology, and in fully absorbing mature foreign experiences to ensure quality and safety.

Zhou Ping stresses: The basic purpose of China's peaceful use of atomic energy lies in benefiting the people with public safety above all else. In order to strengthen nuclear power station safety controls, of China founded its State Nuclear Safety Bureau in the initial stages of preparation for building nuclear power stations. It coordinated with the State Environmental Protection Bureau and the Ministry of Nuclear Industry in jointly drawing up and making complete and perfect nuclear power safety laws and regulations, in strengthening the safety examinations of the design of nuclear power projects, and in conducting the most strict supervision and examination of the building of nuclear power stations based on the laws and regulations, in order to ensure that every link and work procedure of design, building, installation, regulation, start-up and operations would conform to the requirements of the laws and regulations, and quality control. This was also done to ensure building good quality and safe nuclear power stations.

Is It Necessary To Worry About a Possible Accident at the Daya Bay Nuclear Power Station?

This reporter asked: Some people in Hong Kong have been very much worried about a similar accident at Guangdong' Daya Bay Nuclear Power Station which is under construction, since the Soviet Union's nuclear accident. Is such a possibility great? Is it necessary to have such worry?

Vice Minister Zhou Ping is concurrently on the board of directors of Guangdong Nuclear Power Development Company Limited, and a borad member of the Daya Bay Nuclear Power Station Joint Corporation. He told this reporter that to those who do not understand nuclear power technology well, it is natural that they would have anxiety and worry. This is entirely understandable. It is the same for those who do not know the laws governing swimming and do not master the skill of swimming. They are always afraid that they will drown upon getting into the water. The practice over the past three decades and more has proved that mankind has entirely mastered the law and technology of generating nuclear power. People should not be overanxious about this.

Needless to say it is sometimes very difficult to forecast an accident. However, it has been 32 years since the Soviet Union built its first nuclear power station in 1954. Of the 374 nuclear power stations in various countries in the world, serious accidents have taken place only twice, in the United States and the Soviet Union respectively (although accidents also occurred in other nuclear reactors, they were minor and the incidence was low.) Through analyses of these two major accidents in nuclear power generation history, it is not difficult to arrive at a correct conclusion.

As mentioned above, the disaster resulting from the recent Soviet accident was obviously related to the lack of enclosed safety containing equipment. In March 1979, the U.S. Three Mile Island accident also caused a great shock for a time; however, it did not create the grave result of a radioactive material leak as did the recent Soviet Union accident. In the Three Mile Island accident, the people living within 80 kms of the nuclear power plant were exposed to an average 1 rem dose of radiation, which is only 0.5 percent of the annual amount of natural radiation. The greatest dose of radiation to an individual was 100 rems, which is the same as a single medical x-ray treatment. In more than 100 samplings of air in the neighborhood of the nuclear power plant, the greatest density of radioactive iodine was only one-fourth of the permitted density for the inhabitants. No radioactive iodine was found in river water, soil, and plant samplings.

The U.S. Three Mile Island accident resulted from the loss of water because the safety valve was open and failed to return to its normal position. This led to a partial meltdown of the reactor fuel rods, and was forced to be shut. It was after all a grave accident. But why did it not create any danger to the public? The basic reason was that a rather safe pressurized-water reactor was used, with an entirely enclosed container which ensured no leakage of radioactive materials.

Today, Guangdong's Daya Bay Nuclear Power Station does not follow the safety standards of Three Mile Island Power Plant. It will follow far higher safety standards. The Daya Bay Nuclear Power Station is to adopt France's newly developed "Vanguard-type" safety valve. This has solved the problems of the aging or ineffectivenes of the spring in the old-type safety valve used by the Three Mile Island Power Plant. Moreover, all-round cooperation with France will be implemented in building the entire Daya Bay Nuclear Power Station, with all the major equipment made in France. Today, France's nuclear power volume accounts for 64.8 percent of the country's total volume of generated energy. At present, 44 nuclear stations are in operation in France, with another 17 under construction, most of which are of the pressurized-water type reactor, and which are located very close to inhabited areas.

Zhou Ping says that China takes France's safety standards as the minimum in building the Daya Bay Nuclear Power Station. It has adopted a design, which is the safest to date, which has three enclosed shields including a zirconium enclosure for nuclear fuel parts, a pressurized container, and a safety enclosure to ensure no radioactive leak gets into the atmosphere in case of an accident. In case the water injunction system in operation is out of order, another system will promptly and automatically inject water to prevent a meltdown if the supply of water is impeded. In case of a burst pipe, another water spraying system will go into action immediately to cool down the high-temperature steam spurting out from the pipe burst in order to prevent further damage to other parts of the installation. As for the power supply equipment, the station has adopted the principle of designing several stand-by systems. In case of an accident, the equipment will stop automatically and another system will automatically start to operate, so as to ensure enough power supply to recover control. A strick set of regulations has been stipulated concerning nuclear power station personnel. On the basis of strict selection of these personnel, the relevant state departments will send them to France for rigorous training, so that they may become skillful in operations and have the ability to handle any emergency. Then they will go through a strict national examination certifying them before they are allowed to work at the nuclear power station. Therefore, both Guangdong's Daya Bay Nuclear Power Station and the Zhejiang Qinshan Nuclear Power Station are built on a scientific basis and in entire conformity with the safety standards stipulated by the International Atomic Energy Authority. The problem of "being venturesome" does not exist.

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CSO: 5100/7

PAPER REPORTS NUCLEAR WASTE DUMPED IN HEBEI PROVINCE

Hong Kong SOUTH CHINA MORNING POST in English 24 May 86 p 1

[Text] Twenty-five tons of solid radioactive waste were dumped into a dry well in Hebei province in June 1985, sending radiation readings soaring to several hundred times their normal level, the CHINA DAILY reported yesterday.

The radioactive pollution threatned both surface and under ground water supplies before being cleared at an unspecified date, the paper said.

The report made no mention of illness from the pollution.

Two party and Government officials in Hebei had been dismissed from their posts for their role in the affair, the English-language daily said.

It quoted sources at the Beijing Nonferrous Metal Research Institute as saying radiation levels had returned to normal after the well was cleared.

The dried-up well was located along a river seven km from the Xidayang Reservoir. The report said there was a fault in the rock beneath the well.

The Communist Party organ, the PEOPLE'S DAILY, reported yesterday that radioactive clouds from the Soviet nuclear accident at Chernobyl last month had drifted over China in late April and early May.

Commenting on the CHINA DAILY report last night, the secretary of Hongkong Friends of the Earth, Ms Linda Siddal, said the incident appeared to have resulted from the "irresponsibility" of the sacked officials.

Ms Siddall said it was proof that any human error, mechanical failure or irresponsibility could prove dangerous in the use of nuclear substances.

Referring to the contamination of underground water by the radioactive material, she pointed out that some radioactive substances could take up to 300 years to decay underground.

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CSO: 5150/0120

BULGARIA

OFFICIALS EXPLAIN RADIATION LEVELS, SAFETY PRECAUTIONS

Sofia RABOTNICHESKO DELO in Bulgarian 8 May 86 p 2

[Interview conducted by Yavor Tsakov of Bulgarian Television with corresponding member Professor Lyubomir Shindarov, first deputy minister of national health and chief state medical inspector, and senior scientist engineer Ivan Pandev, president of the Committee for the Peaceful Use of Atomic Energy at the Council of Ministers, who responded to questions concerning radiation conditions in the country. Presented in slightly abbreviated form]

[Text] Following the announcement of the accident at the Chernobyl atomic power station, surveillance of radiation conditions in Bulgaria has been intensified, said Ivan Pandev. The systematic controls conducted so far show a reduction of the general radiation background and a trend toward normalization. For example, the six-hour summary today reveals that the radiation background is in the process of returning to normal. It is increased in only five okrugs, which is insignificant. Research has shown that, up to May 2 1986, radiation conditions in the country were normal, and we have already informed the public about this. On May 2, the movement of air masses from the north began. Toward the end of the day, we began to register an increase of the natural background of up to three times the natural background radiation in different parts of the country. We analyzed samples of air, rainwater, soil, open reservoirs, vegetation and milk, collected from the entire country. The results showed that, at isolated points and in a part of the samples, the content of some radioactive isotopies was increased, chiefly that of iodine 131. The concentration of the radioactive isotopes found in the air is lower than the admissible limits for the population.

How much lower?

Depending on the region, it can be 3, 5 or 10 times lower. The same applies to drinking water. In the next few days we expect the radioactivity in the country to be reduced, for two reasons: first -- due to a reduction in atmospheric deposits, and second -- because of the characteristic of radioactive isotopes to become less active with time. The major portion of radioactive isotopes found are short lived and and lose half of their activity very rapidly; the activity of iodine-131 lhalves every 8 days, i.e. it takes

8 days to semi-disintegrate. This means that after 24 or 32 days it will be reduced by 8 to 16 times.

If we compare conditions in our country now with conditions at the time of the atomic explosions conducted at the beginning of the 60's, i.e. up until 1963 when the treaty banning the testing of atomic weapons in the atmosphere, on land and in water was signed, the data show that artificial aerosol radioactivity during the period 1954 to 1963 exceeded that currently contained in the air by approximately 1,000 times.

Radiation background in okrugs where there was an increase is now: Kurdzhali - 007 milliroentgens per hour; Gabrovo - 007 milliroentgens per hour; Stara Zagora - 006 milliroentgens per hour; Yambol - 007 milliroentgens per hour; Sliven - 006 milliroentgens per hour. The normal radiation background for the country is 0015, 0025 milliroentgens per hour. These data are within normal range.

To the question whether the increased radiation would be transferred from the atmosphere to the soil as a result of the rain that had fallen and whether it was necessary to take some steps to counteract this, Ivan Pandev replied:

Yes, of course, the rainfall carried part of the radioactivity from the atmosphere to the earth. However, only the topsoil is contaminated and, since the quantities are insignificant, it is not necessary to take steps to decontaminate the soil, i.e. to disinfect it.

For his part, Professor Lyubomir Shindarov indicated that there was no danger to health and [no need for] anxiety. We are receiving the most accurate information about the environment in which our population lives works and rests. I must emphasize, he said, that this concerns a slight increase in background only in isolated regions of the country. The degree of the increase, which characterizes the general radiation background, is insignificant and, from the medical point of view, it can be categorically stated that it does not pose a danger to health, neither to the health of children, even the smallest ones, nor mothers, nor pregnant women, nor active people, nor the elderly. We do not have a situation where people have been irradiated, and there is no danger to health from this slightly increased radiation background.

Nowhere in the country is the drinking water contaminated by radiation; it may be used in full safety for drinking and other daily uses. Milk poses quite a different question. Investigations of ewe's milk have shown increased radioactivity which is connected with contamination of the grass during the rainfall when the air mass swept over the country. The rain made its way, with the grass and the radioactive particles of food, to the milk glands and, from there, into the milk. I would say that this was detected in good time and we stopped the use of ewe's milk in good time. The ewe's milk is being processed into non-perishable goods, and will be stored until such time as the danger from its used has passed, but that will will occur after the medical agencies have completed the necessary control. Cow's milk is totally safe to consume and we are no longer banning it. If radioactivity rises in it too, then we shall halt its use. And yet, I would like to remark that, as a precaution, in some places we are recommending the use of dried milk. For example, in the okrugs of Sofia, Gabrovo, Vratsa and certain others. We are continuing to watch the situation with cow's milk most carefully, and we shall react most quickly if it becomes harmful, so that on no account will there be any danger to health from the consumption of this product.

With respect to fresh vegetables, I should like to emphasize that in certain regions now there is increased radiation contamination of leafy vegetables, such as lettuce, spinach and onions. In connection with this, I would like to explain that this concerns superficial contamination by radioactive particles stuck to the leaves and not contamination of sap absorbed from the soil. By abundantly and diligently washing the vegetables, one could reduce this radiation contamination to a considerable degree; nevertheless, given the present findings, we recommend that consumption of such leafy vegetables be limited for the time being. In their place, cucumbers, tomatoes and hothouse vegetables in general may be freely used without any danger to health since they are not contaminated by radiation.

With respect to fresh meat, recent investigations, conducted by the Scientific Institute of Radiology at the Medical Academy -- and these investigations were done on a large sample of animals located in those areas that were most affected and, moreover, a high-risk group of animals that had eaten grass -- I would like to say that their meat is totally safe. This goes for veal, mutton and lamb, which are herbivorous animals. I do not mention pork and poultry, which are not grass fed, and their meat is, on principle, totally safe to consume.

The extent of radiation and its transient character, with a pronounced trend toward normalization, did not give grounds for the health authorities to resort to iodine prophylaxis. I should like to point out that, even in the days before the first increase in radiation was determined in Bulgaria, the necessary quantities of iodine preparations were assured in all pharmacies and pharmacy warehouses, and we were fully prepared to proceed with iodine prophylaxis but the necessity for such a precaution did not arise. The accurate calculations made by our best specialists at our Institute of Radiology revealed that such minimum quantities of radioactive iodine -- that has the capacity to accumulate in the thyroid -- enter the human organism; and we repeatedly increased this, so to say, during the computations, and also for longer periods, in order to have a model of the extreme conditions which could emerge for the health, and the extreme danger, and I must say that, even in these conditions -- which could not arise, we are not dealing with quantities that call for iodine prophylaxis. Iodine prophylaxis was carried out in some European countries where the general radiation background and contamination of the external environment of food products was considerably higher. As far as other prophylactic measures of a more general nature are concerned, I would say that these concern maintaining personal hygiene. We are recommending, for example, that for a certain time and for the next few days small children avoid playing in open areas where there is a lot of dust and digging in sand and dust and that mothers wash the children's hands regularly and bathe them regularly.

Far more resources are put into atomic power stations to make sure that they operate reliably than are put into facilities of a similar nature, said Ivan Pandev later. We should point out that up to 50 percent of the capital investment for the construction of atomic power stations is tied to ensuring their reliability. All systems ensuring safe ioeratuin of atomic stations are supplied three ways, insured three-fold. These means that it is sufficient if only one of the three channels for each system goes into action for the functions safeguarding reliability and safety to operate. All that has been said up to now applies in full measure to our power station in Kozloduy.

With respect to the effect of the accident at Chernobyl on the development of atomic power here and throughout the world, I should like to make the following comment: atomic power is one of the greatest achievements of mankind during the second half of our century. At present there are more than 350 power reactors operating in the world. This branch of energetics is developing particularly rapidly in such countries as France, Sweden, Belgium, Japan, the Federal Republic of German, etc. For example, in France the share of energy produced by atomic power stations has already surpassed 60 percent. Atomic power prevails not only because of the limitations of other energy sources but also because of a number of advantages of an economic and ecological nature. For us, the use of power produced by the atomic power station at Kozloduy has replaced the excavation, transport and burning of hundreds of thousands of trucks of lignite each year, with all the ensuing consequences for the landscape and the population if this coal were burned in a thermoelectric power plant.

Irrespective of the event at the Chernobyl atomic power station, the program to construct atomic power stations will continue, in the West as in the socialist countries.

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CSO:5100/3041

NEW LAW TO PROTECT RADIOACTIVE MATERIALS WORKERS

West Berlin IWE TAGESDIENST in German No 80, 27 May 86 p 2

[Article datelined IWE Berlin 27 May 86: "Improved Radiation Care for Reactor Personnel in the GDR"]

[Text] In a directive dated 25 March 1986--about 5 weeks before the reactor accident at Chernobyl--the State Office for Nuclear Safety and Radiation Protection instituted improved radiation medicine treatment for persons exposed to radiation on the job. The directive takes effect on 1 July, and replaces corresponding regulations dating from 1970. It obliges workers at nuclear plants and radiation facilities, as well as in uranium mines, to submit to fitness and monitoring exams at minimum intervals of 1 to 4 years. The exams are "to take into account special work demands on those working with radioactive substances and on the support personnel, prior exposure to radiation, ...other harmful effects, and the exposures and dosages to be expected as a condition of the work." In the event of "extraordinary occurrences" of radiation dosage exceeding acceptable levels, special monitoring followup examinations are to be carried out. Publications about treatment labeled radiation medicine require the approval of the State Office for Nuclear Safety and Radiation Protection.

Ongoing, periodic treatment is supposed to provide timely care for illnesses and impairments to health, to prevent or limit complications, and to permit early recognition and treatment of long-term radiation damage. The continuing treatment program will include workers, in particular, who "have an accumulated effective dosage equivalent to more than 1 Sievert (= 100 Becquerels)," or who "repeatedly exceed the basic acceptable dosage for radiation exposure by a wide margin," as well as those persons suffering long-term aftereffects of work-related radiation accidents, or work-related illnesses resulting from exposure to ionizing radiation. Treatment of this group of persons is to be conducted by the radiation medicine specialist in the State Office. There are, in addition, radiation medicine specialists assigned to the industrial hugiene inspections in the GDR bezirks, which are tasked with conducting the periodic monitoring examinations.

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CSO: 5100/3043

YRIART ON IMPENDING ARGENTINE-BRAZILIAN NUCLEAR AGREEMENT

Buenos Aires AMBITO FINANCIERO in Spanish 12 May 86 p 13

[Article by Martin F. Yriart: "Historic Agreement Between Brazil and Argentina Revolutionizes International Politics]

[Text] During the entire decade of the 1970s Argentina and Brazil were constantly under the scrutiny of the superpowers, who were trying to see if there was a budding nuclear arms race between these two neighboring nations, which are traditional rivals in Latin America. The specter of an Argentine-Brazilian arms race was used malevolently in an attempt to impede their peaceful nuclear development. This was made easier by both countries' refusal to sign the Non-Proliferation Treaty or to accept the terms of the Tlatelolco Treaty, which they considered discriminatory. Now both nations are preparing to sign an agreement calling for the mutual inspection of their nuclear facilities. This will dispel once and for all any suspicion that either of the two may be building an atom bomb.

Argentina and Brazil are to sign an agreement providing for the mutual inspection of their nuclear facilities. This will put an end to international concerns about the possibility that either of the two nations may engage in an arms race to produce an atom bomb. The Brazilian nuclear physicist, Jose Goldemberg, president of the University of Sao Paulo and a member of the nuclear policy commission advising Brazil's President Jose Sarney, told AMBITO FINANCIERO this yesterday.

This announcement contains a real success for Argentina's nuclear diplomacy which has been working on this initiative for over 2 years. It is designed to free Argentina from its present position of relative isolation because of its refusal to sign the Non-Proliferation Treaty or to ratify the Tlatelolco Treaty. The reciprocal inspection agreement with Brazil would be open to signature by other nations of the region, thereby creating a real safety zone in the continent, which should effectively dissipate any fantasies about nuclear proliferation. It is believed that Mexico might be one of the first countries invited to join in signing this new accord.

Goldemberg stated yesterday that the Brazilian initiative is contained in the recommendations which the commission sent to President Sarney 2 weeks ago. He said he takes it for granted that the Brazilian chief executive will adopt the commission's recommendations, as they have the backing of two prestigious and influential Brazilian academic institutions, the Brazilian Physics Society and the Society for Scientific Progress.

"The agreement will make it possible to dispel mutual distrust between both countries," said the Brazilian physicist, who did admit, though, that there had been resistance to this initiative on the part of some political groups in Brazil. That opposition has now been overcome.

"There are people who think that Argentina is much more advanced in its nuclear development than Brazil, and that a close and unlimited cooperation agreement would be a sort of 'unequal marriage.' A match between a clay pot and an iron pot," said Goldemberg, using a common Brazilian expression. Nuclear specialists in Brazil, though, are quite well informed about the status of Argentina's nuclear development, added the scientist, and see nothing detrimental for Brazil in this new initiative.

The report sent to Sarney by the advisory commission includes a recommendation to rescale the nuclear plan and rearrange its schedule. According to Goldemberg, the commission recommended completing the two nuclear power plants currently under construction (Angra II and Angra III) and postponing a decision to begin new projects until 1989. "I believe those decisions should be made by the next administration," said Goldemberg.

According to the Brazilian physicist, Brazil would renegotiate its technology transfer agreements with the Federal Republic of Germany and also revise the makeup of the stock portfolios of the joint German-Brazilian enterprises handling power plant construction and the production of components, supplies, and nuclear fuel, over which the German partner now holds veto powers. In the opinion of some Brazilian political sectors, this diminishes Brazil's decision-making powers in this field.

The commission's recommendations reportedly include the liquidation of three enterprises set up under the German-Brazilian cooperation agreement: NUCLEP [Heavy Equipment, Inc], NUCLEI [Isotope Enrichment, Inc], and NUCLAM [Mining Assistance, Inc] (involved in the construction of nuclear power plants) and the privatization of NUCLEMON [Monazite and Associated Elements, Ltd] (which handles exploration and development of uranium deposits).

The commission also recommended creating a new agency under the office of the presidency, to monitor nuclear safety and radiological protection of atomic facilities, including power plants and research reactors.

Cutback

The cutback in the Brazilian nuclear plan to only two power plants and the dissolution of industrial enterprises in this sector is an explicit recognition that the prospects of growth in Brazil's energy demand have changed substantially from what they were in the 1970s, when the ambitious plan for eight power plants was conceived.

The creation of an independent nuclear safety agency will place Brazil one step ahead of Argentina, where nuclear safety is handled by the same authority that builds and operates power plants. This has drawn criticism from groups concerned with environmental protection and population safety.

The creation of this new agreement which totally opens up the borders between Brazil and Argentina in the field of nuclear energy may be a decisive step toward a joint--or even subregional--development program that will significantly improve the efficiency of nuclear energy investments. This would lower the costs of electricity, making the economies of both countries more competitive.

The advisory commission's recommendations lead us to believe that Brazil is prepared to adopt the "Argentine model" for nuclear development. This model is based on the creation of its own independent capability in science and technology, not on technology imports, as Brazil's military regime had preferred to do.

This mutual inspection agreement may once again open up Argentina's doors to nuclear imports from countries such as Canada, which now refuse to export such materials to Argentina because of a fear of contributing to an arms race in the region.

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CSO: 5100/2076

OBSERVER: NUCLEAR TECHNOLOGY GROWTH PLAYING WITH FIRE

Dhaka THE BANGLADESH OBSERVER in English 19 May 86 p 5

[Editorial]

[Text] The accident occurring at the Chernobyl nuclear plant in Russia has punctured the nuclear vaunt, built over half a century or so, it seems, more decisively than the Three-Mile Island mishap did—or could have done. With the picture of the after effects of the radiation leak at Chernobyl becoming clearer, after about 3 weeks, it should be possible to make a more accurate assessment of the short and long term damage of what could only be guessed at, earlier. The latest news, from the horse's mouth, (Dr. Gale, the US Bone Marrow Transplant expert flown to Chernobyl) is that about one lakh or more people would be affected by the radiation from Chernobyl plant. His reservation that no great numbers of people would die immediately from the effects of the radiation is small comfort. For the greater but insidious danger lies in the more than 1 lakh being in need of perpetual medical monitoring, to be treated for possible attacks of cancer or other lethal diseases. Atomic explosion and the radiation has been found to be responsible for cancer and similar killing diseases, in the long run, among those affected by it.

Incidentally, the 'catastrophe' at Chernobyl, happening behind the iron curtain, had nonetheless broken through the political barrier that keeps East and West far apart. Offers of expert help in the work of rescue and relief in all forms came unstintedly from the West in Russia's great disaster. There is no extenuating the fact that the Chernobyl accident was openly and intrinsically the most shaking event of the world of the last fortnight. It has cut across political or diplomatic rivalries and set in train fresh thoughts about the latest and most expansive technology, offering not merely the bomb but opening up fresh vistas of renewable energy supply, making for untrammelled economic growth.

The Chernobyl accident must have altered, in a significant way, such prospects of safe and uneventful utilisation of nuclear technology and energy for human development. People's confidence—as well as, by now, the self-assurance of experts—is bound to be shaken by the two events of Three-Mile Island and Chernobyl, plus other lesser accidents. The fact that experts, more than the layman, have to face up to is that he as well his technology is fallible. Unlike the natural systems, such as the solar one, human systems can never be rendered proof against dangers, rising from either simple human error or the failure of technology. The space shuttle, Challenger, by the way, boasting the best of technical security measures also failed. (Subsequent discovery that the shuttle was flawed because of the rubber seal that failed does not alter the fact that technology was caught on the hop by the unforeseeable). So is the case with the high precision technology involved in designing and making aircraft—also with its average of disasters occurring either from human or technical failure.

The risk, borne out by actual incidents, would not however mean that 370 reactors now operating around the world should be closed down forthwith. Arguably, immunity and security measures could, in course of time, through trial and error, be improved enough, at least to bring down to a minimum the rate of disasters. So, merrily go on setting up nuclear plants to produce cheaper energy or the bomb. Against the shattering backdrop of Chernobyl, it should be curious to note that nuclear proliferation is going on not only between the super-powers. Even sub-or sub-sub-powers also are acquiring the technology—some for avowed peaceful purposes, some for making the bomb behind the facade of peace—and some doing the bomb openly. And in most of the cases some super-power or other encouraging and enabling the sub-power to do so.

But this is playing, literally, with fire, if Chernobyl is any experience to guide. Of course, there is no scrapping of the whole set of different technologies, because they will fail from time to time and cause human tragedies. Nevertheless, it is time perhaps to draw the line between the technologies, considering the magnitude of damage, actual and potential, and its relative proportion between them. This may be out of line with the humdrum no risk, no gain. But where, say, in a particular technology, the risk is far greater than the gain, and if the risk is such that even peacetime technical failures can be so massively lethal—let alone a war—the question is if such a technology is at all acceptable. It is dreadful to contemplate that the risk of cancer and other complications from radiation involving tens of thousands of people may extend for 30 or more years. Rutherford's finding of the secret of the atom and the subsequent release of the genie of uncontrollable power may not have foreseen all these at its time.

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CSO: 5150/0123

BRIEFS

AEC ON CHERNOBYL--Bangladesh Atomic Energy Commission in a statement on Thursday announced that Bangladesh environment remained free from pullution following recent nuclear disaster at Chernobyl Nuclear Power Plant in Soviet Union. The announcement was made following a meeting between the Atomic Energy Commission and senior medical doctors of nuclear medicine institute and centres. The health physicists of Bangladesh Atomic Energy Commission had been monitoring the local environment for the last ten days. [Text] [Dhaka THE BANGLADESH TIMES in English 16 May 86 p 1] /9274

CSO: 5150/0122

GANDHI RECEIVES PROPOSAL FOR NUCLEAR SAFETY PARLEY

Madras THE HINDU in English 22 May 86 p 1

[Article by G. K. Reddy]

[Text] New Delhi, 21 May--The West German Chancellor, Dr Helmut Kohl, has proposed an international conference of high-ranking government representatives and those representing the relevant international organisations to consider ways and means of providing better protection to the world community from the hazards of nuclear accidents.

He has taken this initiative in the wake of the Chernobyl disaster which exposed the Soviet Union and other European countries to radiation.

The West German Ambassador to Delhi, Dr Guenther Schoedel, called on the Foreign Secretary, Mr A. P. Venkateswaran, to hand over a letter from Dr Kohl to the Prime Minister, Mr Rajiv Gandhi, who is one of the heads of government of the 33 countries operating or building nuclear power stations. The West German Government has offered to host this conference along with a preliminary meeting to settle the agenda for it.

He has envisaged the following three major objectives for this conference:
(1) Creation of a mechanism for information which would guarantee an immediate and comprehensive exchange of information in case of a nuclear accident,
(2) Elaboration of a set of principles with which international cooperation for coping with the consequences of nuclear accidents could be improved, and
(3) Codification of internationally binding safety standards in order to reduce detrimental effects beyond national borders.

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CSO: 5150/0113

INDIA

NUCLEAR POWER BOARD CHAIRMAN INTERVIEWED ON SAFETY

Bombay THE TIMES OF INDIA in English 18 May 86 Supplement p 1

[Interview with Dr M. R. Srinivasan, chairman of the Nuclear Power Board of the Department of Atomic Energy, by S. Kumar]

[Text]

Can you estimate the damage caused to the Chernobyl reactor from the details available?

It may not be a large-scale core meltdown. It is reasonable to think of limited fuel damage. If the pressure tubes ruptured, water and steam could have come into contact with the hot graphite. Steam disassociates into hydrogen and oxygen. Hydrogen mixes with carbon monoxide, causing an explosion. The graphite and fuel are in a stainless steel vessel in the RBMK type of reactors. The top of the reactor building is like any other industrial building.

In 1957, at the Windscale military facility in the UK, the graphite core caught fire during what was called the annealing process. But, in Chernobyl it was a different sort of fire. There was an explosion.

We feel that large reactors like Chernobyl should have secondary containment.

How do Indian reactors differ from the RBMK type?

Firstly, no Indian plant uses graphite as a moderator. Secondly, our reactors have secondary containment. These are the major differences.

Our reactors have additional safety features like the double containment envelope; filters in annular space between the double walls; a vapour suppression pool at the bottom of the primary container; air coolers for post-accident depressurisation and automatic bottling up of radioactivity through isolation valves.

In Tarapur, there is a dry well and a steel containment vessel connected with the vapour suppression pool to bring down the pressure in the reactor building. In Rajasthan, there is a dousing system and water spray system to bring the pressure inside below the design pressure of the reactor building. We have adopted a more cautious approach in our siting policy ensuring low population density around the plant. We provide a one mile exclusion zone and upto three miles, no additional increase in population is allowed.

Our pressurised heavy water reactors have a relatively low power density which means the energy produced per unit volume of the core is low. This is an inherent advantage. More power density means more challenging safety engineering.

What lessons can be drawn from Chernobyl at present?

We have to wait for some time before we can learn any lessons from it. We will take note of safety aspects as we did in the case of TMI. There is no final word in technology. We learn continuously.

What is known as "probabilistic risk assessment" is becoming popular. If there are inadequacies, one has to engineer them. It may mean redesigning in some respects.

In the event of an accident necessitating evacuation of the public, are we equipped to face the challenge?

Off-site emergency plans for the Tarapur and Rajasthan plants have already been drawn up in consultation with the local authorities, health officials, civil defence, transport authorities and so on. These plans have already been approved by the safety review committee and the Atomic Energy Regulatory Board is now reviewing the plans. To ensure that the plan works, we will soon arrange emergency drills.

Referring to the Bhopal disaster, nuclear scientists commented that such an accident would never occur in a nuclear power plant because nuclear technology followed the "fail safe system". Can you say now that such accidents will not occur in nuclear plants?

We designers never say it will not occur. To a large extent, we have succeeded in controlling the impact. Hence, there were no radiation-related deaths from a civilian power reactor. The concept of a "fail safe" system is still relevant. But greater care must be given to high technology.

While we express concern about a nuclear accident, general accidents do not attract our attention. We are totally indifferent to these general accidents. Human life is valuable in those cases too. It is not that concern is misplaced in nuclear-related accidents.

You may have full proof safe technology. What about human error? After all, it was indicted in TMI.

Because of our social structure, we in India deploy a larger number of university-educated engineers and scientists in these plants with sound training. This is an important factor contributing to safety. They are well-trained people with a good theoretical background. We will soon press into service simulators to assess the response of operating personnel to abnormal conditions in the plant. The TMI operator had limited training. The Europeans have begun to realise this.

Will you ensure safety at whatever cost?

All modern technology has to be used with a great deal of care to protect the environment and the general population. A good safety design need not be uneconomic or much too complex.

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CSO: 5150/0112

INDIA

CORRESPONDENT INTERVIEWS NUCLEAR POWER BOARD CHAIRMAN

Madras THE HINDU in English 23 May 86 p 8

[Text]

THE accident last month at one of the reactors of the Chernobyl nuclear power plant in the Soviet Union has come as a rude shock to the nuclear power industry round the world. Nuclear engineers had maintained that an accident severe enough to damage a reactor core is likely only once in, say, 10,000 reactor years of operation. Yet in just 17 calendar years, the world has seen two serious accidents—at Three Mile Island in the United States in 1979 and now at Chernobyl.

The Chernobyl reactor was one of 12 units in the Soviet Union of a type known as RBMK-1000, that contribute roughly 60 per cent of the nation's nuclear power. It uses uranium dioxide as fuel, and stacks of graphite to moderate the chain reaction. The graphite stack is contained in a stainless steel vessel, which has an inert atmosphere of nitrogen and helium to prevent the oxidation of graphite. The reactor is cooled by water.

Shocking failure

Soviet engineers had taken pride in the RBMK's safety systems, saying that these were capable of eliminating any hazardous escape of radioactive material even in the case of unlikely accidents. Yet the safety systems failed shockingly.

What are the implications of this disaster for the Indian nuclear power programme? In an interview in Madras, Dr. M. R. Srinivasan, Chairman, Nuclear Power Board, explains that the reactors in India are of a different design, and therefore the mistakes of Chernobyl might not be entirely relevant. But he points out that studies would be made and if any valid lessons need to be learnt, and changes in Indian designs are called for, these would be carried out.

While listing some of the accidents that have taken place at nuclear power plants in India, Dr. Srinivasan makes it clear that at no time was there a situation that could have led to a 'melt-down' of the core.

"We haven't had a serious accident to date. No life has been lost in any of our installations attributable to radiation," he says.

Loss of coolant

Excerpts from the interview, which begins with an assessment of the Chernobyl accident.

Dr. M. R. Srinivasan: The Chernobyl accident is the most serious nuclear accident till date. We do not have many details yet on the sequence of events, but one can reconstruct possible scenarios. It is likely that there was a loss of coolant from some part of the core due to which steam and water would have come into contact with hot graphite. Normally the graphite is at a temperature of 500°C, and it is well known that when hot graphite comes into contact with steam or water, hydrogen is liberated. The Soviet press has reported an explosion that seems to have taken place. So it seems likely that the initial explosion would have taken place because of rapid hydrogen formation. It is also likely that the protective atmosphere around the graphite would have been lost and the graphite could also have ignited. It is not easy to use water to quench a graphite fire, as this would liberate more hydrogen. And therefore helicopters were used to drop bags of boron, lead and sand to put out the fire.

None of our reactors use graphite. So a graphite-related fire is not relevant in our context. Secondly, the reactor at Chernobyl is encased in an industrial type of building—structural columns with cladding. The reactor core itself is in a concrete pit, where the thickness of the concrete makes it a radiation shield. But the top of the reactor is similar to a normal industrial structure.

Different design

This is a different design from what we use at our reactors. At the Madras Atomic Power Station in Kalpakkam, the pre-stressed concrete reactor building is designed to withstand the maximum possible pressure that can be generated in the event of the worst accident. It has been tested to withstand 13.5 pounds a sq. inch of positive pressure, and the maximum pressure that would build up if the safety systems work as they should is about 7.7 pounds a sq. inch. Even if the safety systems were to fail, the maximum pressure that can be reached is 10.7 pounds a sq. inch.

The "maximum credible accident" we have considered is a double-ended failure of a 10-inch heavy water header, the largest diameter heavy water line that goes into the reactor. If such a pipeline were to break, then quite a lot of coolant would be lost, heating up the fuel and causing a release of energy in the form of hot steam and water. That energy would go into the containment building and build up pressure within it. The device to release pressure in such a situation is the large pool of water in the basement of the reactor building. At Kalpakkam the pressure suppression pool contains some 2,300 tonnes of water. We have also looked at another extreme scenario. Suppose there is a complete reaction of the zirconium fuel cladding with water, the temperature of the water in the suppression pool would rise by only about 20°C even if the other mechanisms of cooling do not work.

When we evolved our containment philosophy for Kalpakkam, we tried to utilise the principles that had been used partly at Tarapur and partly at RAPS (Rajasthan Atomic Power Station). We adopted a partial double containment at Kalpakkam. We have gone a step further to a double containment at the Narora Atomic Power Station.

Another point to bear in mind is that in a heavy water reactor, if the heavy water is lost there is no possibility of any neutronic reaction. Heavy water being the moderating material, the uranium fuel cannot sustain a nuclear chain reaction without it. Without heavy water, at worst there will be local heating. Once the chain reaction stops, the neutron population in the reactor dwindles and the fission process does not take place.

If power supply fails

Q: You expect the power supply to fail in such accidents. So how would the safety mechanisms activate?

MRS: The essential safety related systems depend on power supply from diesel generators on site. We have two diesel generators for each reactor, and one is adequate to keep the safety systems supplied with energy. Now at Kalpakkam we are putting a third diesel generator—this was a decision taken some time ago—which can be used with either of the two reactors.

Q: In the event of a fire, even the cables from the diesel generators to the safety mechanisms might be destroyed ...

MRS: It is for this reason that the cables are routed through different paths. I am glad you raised the question of a cable fire situation for we had a fire in RAPS-II some months ago inside the reactor building. There was a fire in a cable that was going to one of the main reactor coolant pump motors, but we were able to contain the fire. The consequences of the fire were economic. There was an outage, but there was no radioactivity dispersal. Subsequently, an analysis was carried out and some lessons were learnt. Any major reactor incident always throws up lessons that should be learnt. It is like the aircraft industry. Whenever there are crashes not attributable to bombs, there are objective lessons learnt that are later incorporated into the design.

New safety features

Q: In the light of the accident at Chernobyl, are you thinking of building new safety features at our reactors?

MRS: We constantly analyse accidents that can possibly take place such as moderator-heat exchanger tube failure, steam generator tube leak, large loss of coolant. The scenario is built up, and then we write out the procedure to contend with such situations. What is to be done is then prescribed and given to the operating staff. This type of analysis goes on all the time.

The nuclear industry right from its inception has grown with an awareness of the risks involved. Right from the days when the first reactors were being designed, various types of possible failures were examined and the designs checked to satisfy that under all the failure conditions there would be no serious risk to the personnel working at the plant, to the equipment and the general public. This tradition has been maintained and formalised over a period of time.

In this sense, nuclear technology is different from chemical plant technology. I'm not sure that a similar formalised system of accident analysis, analysis of upset conditions, and the impact on plant personnel and the public is carried out.

Although the Chernobyl accident is a bad one, it is my view that the nuclear reactor technology will gain the appropriate lessons from this and the industry will be made safer.

When the Three Mile Island accident took place we had study groups that looked at the lessons to be learnt, and a number of design modifications have been made since.

While it is true that Chernobyl is a different type of reactor and some of the lessons may not be directly applicable to our plants, we will follow whatever information is available and see if any lessons can be learnt. If we find that changes have to be made or new safety features added, we will certainly make them.

Mishaps in Indian plants

Q: Have there been accidents at any of our plants that did come to a 'core meltdown' situation?

MRS: We have not had that kind of accident so far. I can tell you the kind of accidents we have had to contend with. We had at RAPS the spurious actuation of the dousing system. In the event of an accident and a large release of energy into the containment building, the safety system at RAPS activates and empties a large tank of ordinary water stored at the top of the reactor. The water which is discharged quickly through large valves condenses any steam or water vapour in the reactor and thereby absorbs the energy release. We had a situation when without any real reason, the dousing took place. We later found out that the sensing equipment had picked up a false alarm. With many motors and equipment flooded in water and in need of rehabilitation, we lost the output of the unit for two months. Then we had this fire, also at RAPS, which cut off power supply to the pumps. The fact that something was abnormal was soon evident to the operators and the unit was shut down. There was no loss of coolant because the other pumps were working and we were able to bring the unit down to a safe condition.

So in our many years of operation, we have not really had a situation of the kind that could have led to a 'core melt-down'.

Q: What is the closest that you have got to such a situation?

MRS: There was one incident in Tarapur in 1974, when a very stupid mistake by one of the electrical linemen resulted in the cutting off of the power line to both the units. At that time the switchyard was under the control of the Maharashtra State Electricity Board and the lineman was instructed by MSEB to earth a particular section of the bus. By mistake he earthed the live bus and cut the power lines to the two reactors. But the various safety systems all activated and the operating engineers, also realising that an accident had taken place, took steps to ensure that the reactor safety was not jeopardised.

Because the Indian atomic programme is not large, we have been able to deploy a number of qualified engineers at our reactor installations. At any given time in a shift, there are a number of graduate engineers and these people are not just operators in the sense that they only close valves or open them or just follow instructions. They can also do some analysis on their own.

When the Three Mile Island accident took place in 1979, the enquiry commission concluded that there ought to be qualified engineers at reactor installations at all times—engineers who could understand and deal with any abnormal situation. It is quite likely that in the United States, the cost of having highly qualified engineers round the clock might have been a deterrent. Or maybe they do not have enough engineers relative to the size of the programme.

Fuel failures

Q: Has there been any release of radioactivity from our reactors?

MRS: We have had fuel failures; by failure we mean that the sheath of the fuel ruptures and the radioactive material leaks into the cooling water. An increase in the iodine level is a sign of such leaks. Such increases in the iodine level have been measured at both RAPS and Kalpakkam. Even though these levels can be measured, they are not serious and what happens then is we remove these faulty or failed fuel rods using the remotely controlled fuelling machines. Radioactive material has never leaked out into the environment because of the good containment. In the case of Tarapur also we have had some cases of failed fuel, but because of the off-gas system, where activated charcoal absorbs any iodine, there has been no concern about iodine levels outside the plant.

Q: During the Chernobyl fire, helicopters dropped loads of sand, boron and lead on the reactor. Do we have the infrastructure and the facilities to fight a nuclear fire?

MRS: Well, I'm quite certain that even in the Soviet Union, all the helicopters would have come from the defence forces. It is not as though we do not have helicopters. A nuclear accident of this kind is comparable to floods, earthquakes or some such disaster, and in India disaster management is beginning to be recognised as something that has to be done. I do not expect this kind of accident with the kind of reactors we have, because the designs are different. Nevertheless we should have the capability for disaster management. For example, we had a fire in one of the Bombay High oil wells. One had to mobilise the appropriate response then. That fire did not mean that we should not have offshore oil exploration. We have also had some onshore fires. It only means that we should develop the capability for disaster management.

Q: Are any special efforts being taken in this direction?

MRS: We have various emergency drills in the power stations. We have also prepared procedures for off-site emergencies, involving interaction with the civilian authorities such as the police. We will now examine whether we should have some drills that involve the neighbouring community. Because it is good to be prepared. One must take these drills seriously and get accustomed to the fact that modern living involves certain risks and one should be prepared to face these risks.

Probabilistic analysis

Q: How safe are our reactors? Could you put a figure on the risk factor?

MRS: There is a new branch of analysis called probabilistic analysis. One defines the probability of a reactor accident in terms of one accident in 10,000 reactor years or so. We have logged about 40 reactor years—Tarapur about 32 years and the others about 10. We haven't had a serious accident till date. No life has been lost in any of our installations attributable to radiation.

/9274
CSO: 5150/0114

KOHL SUGGESTION CALLED INTERFERENCE WITH SOVEREIGNTY

New Delhi PATRIOT in English 24 May 86 p 4

[Editorial]

[Text] West German Chancellor Helmut Kohl's letter to Prime Minister Rajiv Gandhi appears innocuous and guided by high moral principles but it is actually part of the continuing effort to circumscribe freedom to utilise the frontier technologies for development by emerging societies. There can be no quarrel with his suggestion that there should be adequate safety measures in the pursuit of peaceful uses of nuclear energy but given West Germany's unseemly scramble to climb the Star Wars technological bandwagon in utter disregard for the gargantuan disasters it makes possible, there is need for India to be wary of the West German initiative. The sudden yen for failsafe safety is the fallout of the Chernobyl disaster in the Soviet Union which the West has milked for all its political and economic value. Bonn has apparently been assigned the task, in the normal division of labour among the NATO military alliance, to turn the attention of its own sizable anti-nuclear movement and that in Europe and the US away from demolishing nuclear weapons stockpiles to the innocuity of safety measures in the peaceful uses of the atom.

By calling for internationally binding safety standards in order to reduce detrimental effects beyond national borders Mr Kohl has adroitly sought to draw a screen across the more disastrous possibilities that the Star Wars programme opens up for mankind. For one thing it makes "limited nuclear wars" possible and Mr Kohl in his communication to Prime Minister Rajiv Gandhi has failed to express any fears about the fallout and radiation such tactical nuclear weapons will unleash on significantly large segments of the world population. And what of concern "beyond national borders" then? Besides, as always, the main thrust of safeguards and safety of the nuclear "haves" has been directed at commercial nuclear enterprises on which sizable portions of the developmental strategies of the emerging nations have been invested and the Kohl proposal is the forerunner of on-site inspection for verification of adherence to the code of safety thereby achieving what could not be done through the infamous nuclear Non-Proliferation Treaty (NPT) — fullscope safeguards to ensure that there is no diversion of nuclear fuel to military purposes. "Fullscope safeguard" was itself perceived by developing nations like India to be a thinly disguised manoeuvre to circumscribe sovereignty and to control the national nuclear energy programmes of the member-states of the International Atomic Energy Agency.

India has done well to put on record at the meeting of the IAEA Governors that that proposed safety measures must also apply to military facilities. If anything the Kohl initiative must be utilised to push for an end to nuclear arsenals and failsafe methods for the peaceful uses of the atom.

/9274
CSO: 5150/0115

CALAMITIES MANAGEMENT OFFICE TO DEAL WITH NUCLEAR SAFETY

New Delhi PATRIOT in English 27 May 86 p 5

[Text] Authorities are considering enlarging the scope of the proposed National Bureau for Management of Natural Calamities (NBMNC) to cover nuclear safety and emergencies, reports UNI.

This is being considered in the light of the recent accident at the Chernobyl nuclear power plant in the Soviet Union.

Though the possibilities of a Chernobyl type of accident is ruled out in the Indian nuclear power plants, the authorities want to strengthen the preparedness for any emergencies in view of India's ambitious nuclear power programmes.

A committee to study the implications of the Chernobyl accident is also being considered by the Government.

Officials sources said the Department of Atomic Energy (DAE) constantly analyses the possibility of accidents in India power plants, particularly in vulnerable areas of moderator-heat exchanger and steam generator.

Accidental burning of graphite stacks as in Chernobyl is unlikely here, as all Indian nuclear plants use heavy water as moderator.

The DAE had even set up a study group to draw lessons from the 1983 three-mile island nuclear accident in the United States.

While planning to entrust nuclear emergency operations to NBMNC, it is envisaged to make the bureau the nodal point for coordinating all relevant agencies, including the Defence forces, in meeting any emergency.

The NBMNC was originally intended to deal with natural calamities like cyclones, droughts and floods. But experiences like the massive fire in Bombay High offshore oil platform and several fires in high-rise buildings have highlighted the need for a national level coordinating agency for such emergencies.

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CSO: 5150/0116

BRIEFS

FRENCH UNIT COMPONENTS--Paris, 19 May (PTI)--Some vital components for India's nuclear power plants are to be supplied by the French company C3F (Companie Francaise de Forge et Founderies), according to a company spokesman. He said the Indian order is for components for the primary circuits of the atomic power plants. The components include pumps, valves, nozzles, casings, trubine rotors and engine components plus the non-magnetic rings of turbine gneerators. The company's plant in Pamiers near Toulose is the only unit in Europe capable of forgings steels, titanium, aluminium alloys and super alloys using a technique called 'closed-die forging' which guarantees the safety norms required by the nuclear and aeronautics market, he said. The Indian order is apparently for the power reactors to be built in Karnataka and at Kakrapar in Gujarat. [Text] [Bombay THE TIMES OF INDIA in English 20 May 86 p 16] /9274

CSO: 5150/0117

IRAQ

BRIEFS

NUCLEAR ENERGY MEETING IN BAGHDAD--Baghdad (QNA)--The scientific conference on the use of nuclear energy for peaceful purposes, which is being organized by the federation of Arab physicists and mathematicians in cooperation with the Iraqi Physics Society, began its meetings here yesterday. The conference, in which 200 specialists in nuclear energy and its peaceful applications participate and which will last one week, will discuss studies on the [Iraqi] 17 July reactor and shed light on the incident of the Soviet Chernobyl reactor and industrial and medical applications of radiation. [Text] [Amman SAWT AL-SHA'B in Arabic 15 Jun 86 p 22 JN] /6091

CSO: 5100/4515

BRIEFS

URANIUM PRODUCTION TO CONTINUE--Niamey, 22 May (AFP)--Uranium production in Niger is to continue, the managing directors of uranium exploiting companies assured yesterday. The managing directors of the Akouta Mining Company (COMINAK), the Air Mining Company (SOMAIR), and the General Nuclear Materials Company (COGEMA), who came to brief President Seyni Kountche on the outcome of the COMINAK and SOMAIR boards of governors meeting, stated that "despite the difficulties caused by the crisis" the accounts of the 1985 exercise were approved, and the companies ended the year "under acceptable conditions." [Text] [Paris AFP in French 2100 GMT 22 May 86 AB] /9274

CSO: 5100/33

REPORT SAYS COUNTRY MAY HAVE SEVERAL NUCLEAR BOMBS

Johannesburg THE STAR in English 31 May 86 p 6

[Text] London--South Africa has the capability to produce nuclear weapons and may have "several bombs in its cellar," according to a report released at a conference on the arms embargo.

But, the report says, secrecy surrounding nuclear relations generally has kept the truth concealed.

Reopening the debate on blasts recorded in Southern Africa in 1979 and 1980 and purported to have been caused by nuclear explosions, Mr Abdul Minty, director of the World Campaign Against Military and Nuclear Collaboration with South Africa, says: "There is no longer any doubt about South Africa's nuclear weapon capability. What is not known is the number of devices it has in stock and the precise nature of the weapons.

"Most of the aircraft in the South African Air Force can easily deliver nuclear weapons and, in addition, it has both ground-to-ground and air-to-ground missiles. There have even been reports that it is working on the deployment of cruise missiles."

He says: "Although South Africa may by now have several bombs in its cellar, it is still highly dependent on external sources of know-how, plant, technology and finance in order to proceed with its ambitious nuclear plan."

At the same time the Anti-Apartheid Movement (AAM) told the conference three British companies were marketing South African-made military equipment in breach of Britain's pledge to uphold Commonwealth, UN and EEC bans on military co-operation with Pretoria.

The AAM says the latest edition of the authoritative Jane's Military Communications contains evidence of the "continuing collaboration" of British companies in the "South African military-industrial complex."

In all three cases the products are military communications equipment.

An Armscor spokesman said: "We do not comment on the sales or purchases of military equipment."

/9317
CSO: 5100/35

SOUTH AFRICA

GRAND PLAN TO DEVELOP NUCLEAR POWER

Johannesburg THE STAR in English 12 Jun 86 p 16

[Article by Sue Leeman]

[Text]

South Africa should be planning to launch a major nuclear programme by the turn of the century, when a second nuclear power station in the Western Cape will become viable, according to the executive chairman of the Atomic Energy Corporation, Dr J W L de Villiers.

Addressing delegates at a conference on South Africa's future energy needs in Pretoria this week, he sketched an ambitious scenario involving expenditure of R250 000 million between the years 2000 and 2035, and the switch-on of the country's first breeder reactor by the year 2025.

Dr de Villiers said South Africa did not have adequate energy reserves and would have to look for alternatives.

REQUIREMENTS FOR ELECTRICITY

At first glance the country's coal reserves looked set to last for another 300 years. "However, this is a fallacious assumption for, if a growth rate of 5 percent in electricity consumption is assumed for the next five decades, it can be shown that our total extractable coal reserves would be committed to electricity production alone by the year 2035."

Dr de Villiers said the country's uranium reserves, if used in the present thermal reactors of the Koeberg type, were equivalent only to some 15 000 million tons of coal, and thus could postpone for only a few years the date when all reserves were committed to electricity generation.

"However, if used in fast breeder reactors, our uranium reserves will be equivalent to some 900 000 million tons of coal, allowing enough time for the development of new energy systems such as fusion, or perhaps alternative renewable resources which could also be used for electricity production."

Dr de Villiers said it was important to time the development of the country's nuclear programme so that available uranium resources were used to the maximum.

"A delay in initiating a local nuclear industry will strain local coal reserves and eventually precipitate a too rapid transition from coal to nuclear power."

Dr de Villiers charted his programme for the industry, saying it could be launched in the year 2000. No more coal stations would be built after 2080.

POLLUTION

"Initially, nuclear reactors will become economic at coastal areas far removed from cheap sources of coal in the Eastern Transvaal.

"As coal becomes scarcer and more expensive, and as pollution and water supply become more problematic, nuclear power will become more attractive.

"Studies have shown that a second nuclear power station will become viable in the Western Cape by the year 2000."

Because local uranium would be limited, he added, nuclear generation would have to be by way of breeder reactors.

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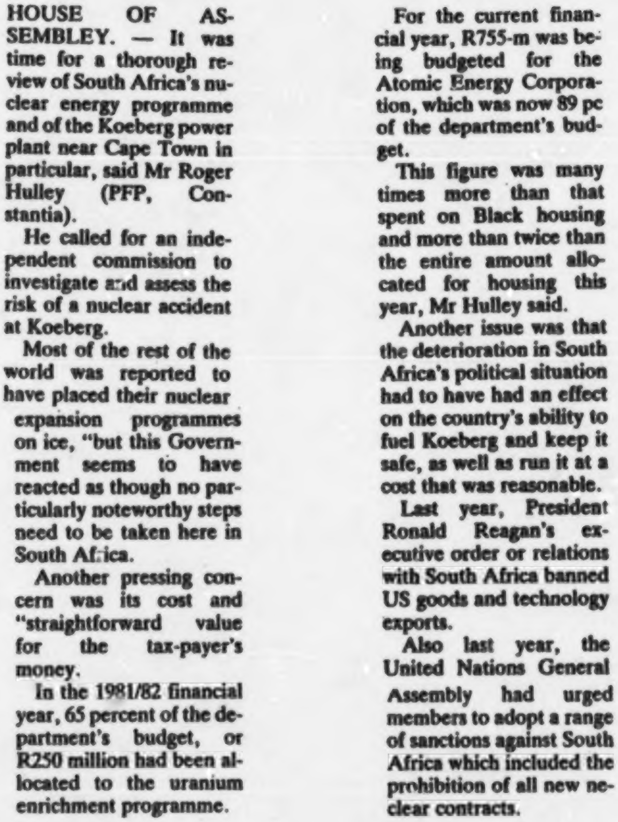
CSO: 5100/35

SOUTH AFRICA

REVIEW OF NUCLEAR PROGRAM URGED

Johannesburg THE CITIZEN in English 7 Jun 86 p 4

[Text]



HOUSE OF ASSEMBLEY. — It was time for a thorough review of South Africa's nuclear energy programme and of the Koeberg power plant near Cape Town in particular, said Mr Roger Hulley (PFP, Constantia).

He called for an independent commission to investigate and assess the risk of a nuclear accident at Koeberg.

Most of the rest of the world was reported to have placed their nuclear expansion programmes on ice, "but this Government seems to have reacted as though no particularly noteworthy steps need to be taken here in South Africa.

Another pressing concern was its cost and "straightforward value for the tax-payer's money.

In the 1981/82 financial year, 65 percent of the department's budget, or R250 million had been allocated to the uranium enrichment programme.

For the current financial year, R755-m was being budgeted for the Atomic Energy Corporation, which was now 89 pc of the department's budget.

This figure was many times more than that spent on Black housing and more than twice than the entire amount allocated for housing this year, Mr Hulley said.

Another issue was that the deterioration in South Africa's political situation had to have had an effect on the country's ability to fuel Koeberg and keep it safe, as well as run it at a cost that was reasonable.

Last year, President Ronald Reagan's executive order or relations with South Africa banned US goods and technology exports.

Also last year, the United Nations General Assembly had urged members to adopt a range of sanctions against South Africa which included the prohibition of all new neclear contracts.

/9317
CSO: 5100/36

KOEBERG COMPARED TO CHERNOBYL

Johannesburg FINANCIAL MAIL in English 9 May 86 p 53

[Text] The disaster at Chernobyl has prompted questions about the safety of SA's Koeberg nuclear power station. However, explains an Escom spokesman, where Chernobyl uses a graphite moderated reactor, Koeberg's is moderated by water.

This is an important difference. Water does not burn, graphite does. The fire at Chernobyl is commonly thought to have occurred when the fuel rods which run through the graphite overheated and set it alight.

Because Koeberg is a pressurised water reactor, a similar accident is impossible. The spokesman also says that safety precautions built into Koeberg are far greater. "The industry learnt a lot from Three Mile Island, he says.

Koeberg's fuel (97% U238 and 3% U235) is contained in ceramic pellets sealed in zirconium tubes within the reactor vessel of 20 cm stainless steel. All this nestles in a 2 m thick reinforced concrete "biological shield" and an outer containment sheild of 1 m reinforced concrete.

This all sits in an airtight containment building made of 1 m thick steel-lined postressed concrete.

The containment system is to prevent leakage of material and radioactivity should the worst happen. Before a meltdown can occur at Koeberg, a number of safety systems would have to fail. "In the event of a loss of coolant accident (loca) there are a number of back-up systems."

The biggest problem in this event would be stopping the reaction before it overheated, resulting in a meltdown. Water which contains boron to absorb neutrons would automatically flood the reactor vessel in the event of a loca.

Another design fault at Chernobyl is said to be that the control rods which absorb neutrons and slow down the reaction have to be mechanically inserted. Koeberg's control rods are introduced into the reactor from the top. They are held by magnetic clips which would automatically drop the rods into the reactor if problems were to arise.

/9317
CSO: 5100/37

CRACKS IN KOEBERG NOT SIGNIFICANT SAYS MINISTER

Johannesburg THE CITIZEN in English 28 May 86 p 4

[Text]

HOUSE OF ASSEMBLY. — The desirability of changes to the design and operation of Koeberg and the Koeberg emergency plan would be considered when the causes and sequence of events at Chernobyl had become sufficiently clear. The Minister of Mineral and Energy Affairs, Mr Danie Steyn, said yesterday.

Replying to questions by Mr Roger Hulley (PFP Constantia), he also said that a number of cracks had appeared in the foundations and containment of Koeberg during and after its erection.

Since these cracks were "all associated with the setting of the concrete during construction" no steps to prevent recurrence were necessary.

Mr Steyn said Koeberg's design was "entirely different" to that of Chernobyl.

Moreover, Escom had an emergency plan, based on the American model, which was as extensive as any other in the world.

Escom was however monitoring the events at and around Chernobyl closely.

"In order to provide further for absolute safety, thorough inspection and test programmes are conducted when the plant is shut down for reloading."

No cracks had appeared in the foundations or containment of Koeberg since the first reactor came into operation.

"Minute cracks however appeared in the lower raft foundation during and immediately after construction as a result of shrinking of the concrete in the normal process of setting.

"In addition, a vertical construction joint in the retaining wall leaked ground water into the foundation area.

"Cracks of this type may occur in major reinforced concrete structures and are provided for in civil engineering design codes.

"Similarly, hairline cracks appeared in the concrete of the containment building. These cracks had no structural significance.

"The leak-tightness of the building is not affected since the inner surface of the containment building is formed by a leak-tight steel shell and the concrete ensures the mechanical strength."

The cracks in the lower raft foundation and retaining wall had been sealed. No action was necessary on the hairline cracks in the containment building.

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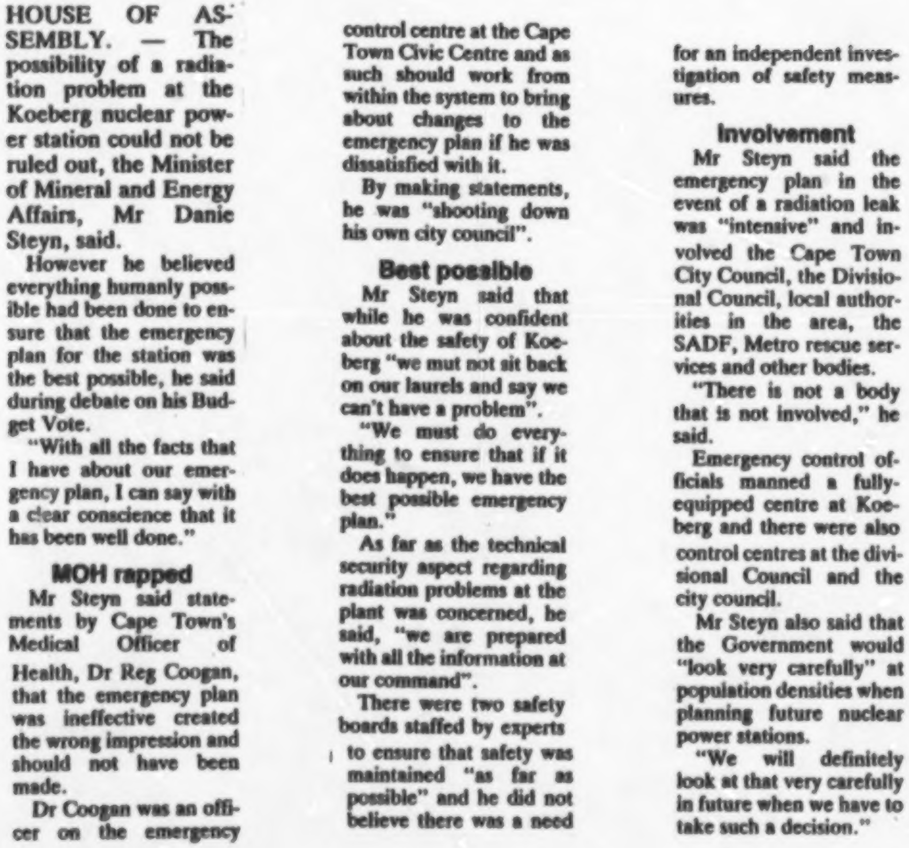
CSO: 5100/36

STEYN PRAISES KOEBERG EMERGENCY PLAN

Johannesburg THE CITIZEN in English 7 Jun 86 p 4

[Text]



HOUSE OF ASSEMBLY. — The possibility of a radiation problem at the Koeberg nuclear power station could not be ruled out, the Minister of Mineral and Energy Affairs, Mr Danie Steyn, said.

However he believed everything humanly possible had been done to ensure that the emergency plan for the station was the best possible, he said during debate on his Budget Vote.

"With all the facts that I have about our emergency plan, I can say with a clear conscience that it has been well done."

MOH rapped

Mr Steyn said statements by Cape Town's Medical Officer of Health, Dr Reg Coogan, that the emergency plan was ineffective created the wrong impression and should not have been made.

Dr Coogan was an officer on the emergency control centre at the Cape Town Civic Centre and as such should work from within the system to bring about changes to the emergency plan if he was dissatisfied with it.

By making statements, he was "shooting down his own city council".

Best possible

Mr Steyn said that while he was confident about the safety of Koeberg "we mut not sit back on our laurels and say we can't have a problem".

"We must do everything to ensure that if it does happen, we have the best possible emergency plan."

As far as the technical security aspect regarding radiation problems at the plant was concerned, he said, "we are prepared with all the information at our command".

There were two safety boards staffed by experts to ensure that safety was maintained "as far as possible" and he did not believe there was a need for an independent investigation of safety measures.

Involvement

Mr Steyn said the emergency plan in the event of a radiation leak was "intensive" and involved the Cape Town City Council, the Divisional Council, local authorities in the area, the SADF, Metro rescue services and other bodies.

"There is not a body that is not involved," he said.

Emergency control officials manned a fully-equipped centre at Koeberg and there were also control centres at the divisional Council and the city council.

Mr Steyn also said that the Government would "look very carefully" at population densities when planning future nuclear power stations.

"We will definitely look at that very carefully in future when we have to take such a decision."

/9317
CSO: 5100/36

HEALTH REPORT CRITICIZES KOEBERG MEASURES

East London DAILY DISPATCH in English 3 Jun 86 p 9

[Text]

CAPE TOWN — Emergency measures in case of an accident at Koeberg were "highly unsatisfactory", Cape Town's Medical Officer of Health, Dr Reg Coogan, said in his health report summary before the amenities and health committee yesterday.

The committee agreed that the matter should be put to the executive committee with a view to approaching the Nuclear Safety Council, a public watchdog body.

Accumulated evidence of the nuclear health hazards to Cape Town's citizens would be placed before them. The evidence includes a study in which a trace element was blown by wind from Koeberg to Green Point, Paarden Eiland and Milnerton.

Other evidence includes advice from nuclear regulatory authorities in the US and Europe that "we need a very viable emergency programme which should be exercised regularly".

In his report, Dr Coogan outlined two major "difficulties" with existing measures.

One was that Cape Town Civil Defence had never been called on to "exercise its capability to reduce casualties in the case of a major release from Koeberg".

"This is despite a number of exercises held before and during the operation of the station and a number of pleas by me."

Dr Coogan said Escom's contention that no significant radio-active contamination would reach Cape Town had been rendered "untenable" by an exercise in November last year, and "ridiculous" by the consequences of the accident at Chernobyl.

The accident exercise in November was held with a postulated westerly wind, and sheltering was considered necessary almost as far as Paarl.

Had the wind been northerly, a large part of Cape Town would have had to be ordered to shelter in the case of a real accident, Dr Coogan said.

Another "difficulty" was that an "unknown nuclear engineer at Escom" on duty at the time was responsible for ordering the emergency measures to be taken to protect the lives of one-and-a-half million people, he said.

At the same time, this engineer would be trying to control a nuclear accident in his own power station.

"Apart from the obvious conflict of interests which must arise, such a farcical arrangement would not be countenanced by any of the nuclear regulatory authorities which council officials visited overseas."

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CSO: 5100/35

SOUTH AFRICA

KOEBERG SAFETY PLANS TERMED 'ADVANCED'

Johannesburg THE CITIZEN in English 4 Jun 86 p 4

[Text]

CAPE TOWN. — Escom has hit back at an accusation this week that its safety arrangements at the Koeberg nuclear power station are "farcical".

A report submitted to the Cape Town City Council's Amenities and Health Committee, by the Medical Officer of Health, Dr Reg Coogan, said Escom's claim that no significant radioactive contamination could reach Cape Town had been "rendered ridiculous" by the consequences of the Chernobyl nuclear disaster.

However, a statement issued yesterday by Escom said it was "unrealistic" to consider the adequacy of the Koeberg emergency plan in the light of the Chernobyl accident.

Escom's divisional manager (Nuclear), Mr P M Semark, said an accident such as had happened at Chernobyl was "impossible at Koeberg".

But, even should such a serious accident occur at Koeberg, the effects would be minimised due to the physical barriers between radioactive material and the atmosphere. These barriers had not existed at Chernobyl, he said.

He said Koeberg's emergency plans were "among the most advanced in the world", and were based largely on American practice.

Mr Semark said detailed plans, administered by the Cape Divisional Council, existed for an area of up to 16 km from the station.

"Beyond the 16 km, these plans are simply extended to whatever area may be affected," he said.

/9317
CSO: 5100/36

SOUTH AFRICA

IMPACT OF NUCLEAR COOPERATION SHUTDOWN VIEWED

Johannesburg BUSINESS DAY in English 23 May 86 p 7

[Article by Hamish McIndoe]

[Text]

INITIAL Soviet silence over its stricken Chernobyl nuclear reactor caused a storm of protest in the West. The disaster underlined the need for the highest safety standards in the nuclear power industry — everywhere.

But nuclear sanctions by Western powers against SA have raised fears that difficulties might be encountered in securing export licences and technology transfers for vital safety equipment.

SA's eclipsing nuclear relations with the West is coursed by former SA ambassador to the US, Donald Sole, in the latest bulletin of the Rand Afrikaans University's Institute for American Studies.

The shutdown of nuclear co-operation with the US, Britain and West Germany is virtually complete after about 30 years of "enthusiastic collaboration".

While the freeze towards SA began in the 1970s, recent US legislation has virtually terminated co-operation in this field.

Last October, President Ronald Reagan's Executive Order on Relations with SA (EORSA) banned US goods and technology exports used in the nuclear field.

Access to International Atomic Energy Agency (IAEA) safeguards to reduce nuclear proliferation risks and preserve safety standards are still assured, the EORSA stressed.

But Sole believes that in the current political climate "problems may even be expected" in securing US export licences for such equipment.

Four months before the EORSA, the UN General Assembly urged members to adopt a range of sanctions against SA, including the "prohibition of all new contracts in the nuclear field".

SA's nuclear rapport with Britain, West Germany and France is now virtually non-existent.

In 1965 the US supplied SA with its first research reactor — Safari 1 — using 90% enriched fuel (also supplied from the US).

Sole regards the EORSA as the end of a long period of co-operation.

The co-operation began in wartime London when a British cabinet member asked Jan Smuts to investigate reported deposits of radioactive minerals in Southern Africa as the US was developing the atom bomb.

Confirmation of the area's uranium potential led to the conclusion, from 1950 onwards, of successive contracts between SA and the US.

SA was one of only seven Western countries invited to participate in the initial discussions of President Dwight Eisenhower's Atoms for Peace Programme, which led to the founding of the IAEA in Vienna.

The bottom line of SA's nuclear isolation is near-total dependence on the country's "native genius" of which, Sole argues, there is no shortage. And there is no lack of raw materials.

The question mark is finance.

/9317
CSO: 5100/34

END